S. HRG. 98-392

GEOTHERMAL STEAM ACT AMENDMENTS OF 1983

HEARING

BEFORE THE

SUBCOMMITTEE ON ENERGY AND MINERAL RESOURCES

OF THE

COMMITTEE ON ENERGY AND NATURAL RESOURCES UNITED STATES SENATE

NINETY-EIGHTH CONGRESS

FIRST SESSION

ON

S. 558

A BILL TO AMEND THE GEOTHERMAL STEAM ACT OF 1970 (30 U.S.C. 1001 ET SEQ.) TO EXPEDITE EXPLORATION AND DEVELOPMENT OF GEOTHERMAL RESOURCES

S. 883

A BILL TO AMEND THE GEOTHERMAL STEAM ACT OF 1970 (30 U.S.C. 1001 ET SEQ.) TO EXPEDITE EXPLORATION AND DEVELOPMENT OF GEOTHERMAL RESOURCES

MAY 2, 1983

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James A. McClure and J. Bennett Johnston are Ex Officio Members of the Subcommittee

Roger Sindelar, *Counsel*

CONTENTS

Page
S. 558 5
S. 883 21
Department of Agriculture report 35

STATEMENTS

Bloomquist, Dr. R. Gordon, geothermal specialist, Washington State Energy Office, Olympia, Wash 74, 78
Cole, Capt. E. William, vice president, Washington office, Union Oil Co. of California 80, 83
Condy, Charles T., president, California Energy Co 118, 121
Hilmon, Dr. J. B., Associate Deputy Chief, Forest Service, Department of Agriculture 67, 70
Jackson, Hon. Henry M., a U.S. Senator from the State of Washington 3
Petty, Arnold E., Deputy Director, Management Services, Bureau of Land Management, Department of the Interior 38, 41
Pritchard, Paul C., president, National Parks & Conservation Association 53, 56
Robbins, Garland, manager, geothermal division, Sunoco Energy Development Co 110, 111
Warner, Hon. John W., a U.S. Senator from the State of Virginia 1
Wright, Robert L., land manager, geothermal operations, Phillips Petroleum Co., and chairman, Western Oil and Gas Association's Geothermal Committee 102, 105

APPENDIX

Additional material submitted for the record 129

GEOTHERMAL STEAM ACT AMENDMENTS OF 1983

MONDAY, MAY 2, 1983

U.S. Senate,
Subcommittee on Energy and Mineral Resources,
Committee on Energy and Natural Resources,
Washington, D.C.

The subcommittee met, pursuant to notice, at 11:40 a.m., in room SD-562, Dirksen Office Building, Hon. John W. Warner, presiding.

Present: Senator Warner.

Also present: Roger Sindelar, counsel; and James T. Bruce, counsel for the minority.

OPENING STATEMENT OF HON. JOHN W. WARNER, A U.S. SENATOR FROM THE STATE OF VIRGINIA

Senator Warner. Good morning, ladies and gentlemen. I am sorry to be a few minutes late. The Republicans are caucusing on the budget. We have been in session since 9:30. For those who are interested, I think we have a conciliatory spirit and there is hope.

I spoke with Mr. McClure who is chairing the session and he suggested that I absent myself and go ahead with this hearing. So please forgive us.

Today the Subcommittee on Energy and Mineral Resources holds a legislative hearing on two bills to amend the Geothermal Steam Act of 1970. On February 23, Senator Jackson introduced S. 558 and on March 23 Senator McClure, along with Senators Laxalt, Hecht, Symms, Wallop and myself introduced S. 883. Both bills would amend the act to expedite exploration and development of geothermal resources.

Geothermal resources, the use of the Earth's heat for energy production, one of America's cleanest, safest and most abundant resources, represents a significant alternative resource which, if developed prudently and expeditiously, it is estimated could replace anywhere from a million to a million and a half barrels of oil per day.

Currently, the geysers in northern California, which is the world's largest dry-steam field produce over 60 percent of San Francisco's electrical power. Other domestic applications for geothermal resources besides electrical generation are industrial and agricultural processing and for home and commercial heating purposes.

Though geothermal is recognized as a significant energy resource, it has been long recognized that this resource has not been commercialized in the United States to anywhere near its maximum potential because of Federal leasing policies and other institutional and economic constraints.

Chairman McClure and Senator Jackson have been leaders in attempting to remove the various barriers which have prevented geothermal resources from being prudently developed.

At the end of last year, this subcommittee was moving toward reconciling differences in geothermal issues in an effort to report out and pass needed geothermal legislation.

The bills, S. 558 and S. 883, currently before this committee are significant steps toward reaching a consensus on these important issues. It is my hope that the committee can move quickly after this hearing to resolve the few remaining differences that exist in these bills and mark them up expeditiously so that we can look to this source of energy.

On behalf of Senator Jackson, at this time I am inserting his statement and the texts of the bills.

[The prepared statement of Senator Jackson, the texts of S. 558 and S. 883, and the Department of Agriculture report follow.]

OPENING STATEMENT OF SENATOR JACKSON AT HEARING ON S. 558 AND S. 883

Mr. Chairman, I am pleased that the Subcommittee on Energy and Mineral Resources is holding this hearing on S. 558 and S. 883, two bills that would amend the Geothermal Steam Act of 1970. As the sponsor of S. 558, I am keenly interested in this matter.

It is important to remember that the geothermal resources located on Federal lands constitute an estimated 60 percent of the total U.S. potential. In 1970, Congress enacted the Geothermal Steam Act to establish a system for leasing these resources for the purpose of commercial development. However, after 13 years, there is still very little commerical development on Federal lands.

Both S. 558 and S. 883 would amend the Geothermal Steam Act to facilitate commercial development. Although there are a number of differences between the bills, I am convinced that most of them can be worked out without much difficulty.

The only issue that gives me deep concern is the protection of the nationally significant thermal features of our national parks and monuments. These thermal features, such as Old Faithful in Yellowstone National Park and the hot springs in Mount Rainier National Park, are a unique and irreplaceable part of any visit to one of our national parks or monuments. Moreover, I am convinced that the geothermal industry can flourish on the immense geothermal resource on Federal lands without ever touching those Federal lands where development might threaten a nationally significant thermal feature.

For these reasons, I am concerned that S. 883 protects only the nationally signficant thermal features of Yellowstone National Park. I know of no reason why the nationally signficant thermal features of our other national parks and monuments should be left unprotected. To the contrary, I believe that there is every reason to enact legislation that provides strong protection for the nationally significant thermal features of all of our national parks and monuments. Such protection is essential if we are to raise the existing acreage limitations and thus allow increased leasing. I look forward to working with the sponsors of S.883, and other members of the Committee, toward that end.

II

98TH CONGRESS
1ST SESSION

S. 558

To amend the Geothermal Steam Act of 1970 (30 U.S.C. 1001 et seq.) to expedite exploration and development of geothermal resources.

IN THE SENATE OF THE UNITED STATES

FEBRUARY 23, 1983

Mr. JACKSON introduced the following bill; which was read twice and referred to the Committee on Energy and Natural Resources

---

A BILL

To amend the Geothermal Steam Act of 1970 (30 U.S.C. 1001 et seq.) to expedite exploration and development of geothermal resources.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Geothermal Steam Act of 1970 (30 U.S.C. 1001 et seq.) is amended as follows:

SECTION 1. This Act may be cited as the "Geothermal Steam Act Amendments of 1983".

SEC. 2. Whenever an amendment or repeal contained in this Act is expressed in terms of amendment to, or repeal of, a section or other provision of "the Act," such reference shall be considered a reference to an amendment to, or repeal of, a provision of the Geothermal Steam Act of 1970 (30 U.S.C. 1001 et seq.; Public Law 91-581).

SEC. 3. Section 2(e) of the Act is amended to read as follows:

"(e) 'known geothermal resource area' means an area designated by the Secretary as a known geothermal resource area prior to October 1, 1979, under this Act, or an area in which there is substantial physical evidence including but not limited to the geology or a discovery on such lands, which would, in the opinion of the Secretary, engender a belief in persons experienced in the subject matter that the prospects for extraction of geothermal resources for the primary purpose of generating electricity in commercial quantities warrant substantial expenditures for that purpose.".

SEC. 4. Section 3(2) of the Act is amended to read as follows: "(2) in any lands administered by another Federal agency or department, including public, withdrawn, or acquired lands.".

SEC. 5. Section 4 of the Act is amended—

(a) by deleting the first two sentences, and inserting in lieu thereof the following:

"SEC. 4. (a) If lands to be leased under this Act are within any known geothermal resource area, they shall be leased to the highest responsible qualified bidder by competitive bidding. Any lands so offered and receiving no bids shall be declassified and leased to the first qualified applicant: *Provided*, That the Secretary's authority to reclassify such lands as a known geothermal resource area at a later date on the basis of new evidence shall not be affected. The Secretary shall offer at least 10 per centum of all lands offered for sale in any year on a basis other than cash bonus bidding, employing those bidding systems set forth in section 8(a)(1) of the Outer Continental Shelf Lands Act, as amended (43 U.S.C. 1335).

"(b) If the lands to be leased are not within any known geothermal resource area, the qualified person first making application for the lease shall be entitled to a lease of such lands without competitive bidding, provided the lands applied for are not designated a known geothermal resource area within one year of the application being filed and before a lease is issued. If an application is rejected due to a known geothermal resource area designation of the lands within one year of the application being filed, the applicant shall have the opportunity to match the highest competitive bid for the parcel when offered, provided the applicant submits a bona fide bid at the sale. However, the applicant or lessee responsible for the exploration resulting in the designation of lands as a known geothermal resource area shall be entitled to noncompetitive leases for all lands in the known geothermal resource area for which the applicant or lessee had first filing applications on file prior to the approval of any plan of exploration or notice of intent to conduct geophysical exploration.

"(c) A reasonable number of leasing tracts, not to exceed 10 per centum of the acreage leased in any year, shall be offered on the basis of a specific application for such tract in accordance with this section to public bodies, including rural electric cooperatives, or nonprofit corporations controlled by and predominantly made up of any of such entities: *Provided,* That the geothermal resource so offered for lease shall be predominantly for use by such entity or entities in implementing a definite plan to produce energy for their own use or for sale to their members or customers (except for short-term sales to others). In carrying out the provisions of this subsection, the Secretary shall not consider expressions of interest by public bodies in lands after (i) in the case of lands not within a known geothermal rescurces area, the thirty-day filing period for a tract has expired and there is a valid pending noncompetitive lease application, or (ii) in the case of lands within a known geothermal resources area, thirty days prior to the offering of a tract for lease.".

(b) by inserting "(d)" before the word "Notwithstanding" at the beginning of the next sentence; and

(c) by redesignating subsections "(a)" through "(f)" as paragraphs "(1)" through "(6)".

SEC. 6. Section 5(a) of the Act is amended to read as follows:

"(a) a royalty of not less than 10 per centum or more than 15 per centum in the case of electrical generation, or of not less than 5 per centum or more than 10 per centum in the case of nonelectrical utilization, of the amount or value, as utilized, of steam, heat, or other form of energy derived from production under the lease and sold or utilized by the lessee or reasonably susceptible to sale or utilization by the lessee. The Secretary may defer royalty payments for nonelectric geothermal developments when it is deemed to be in the public interest, for municipal, cooperative, or other political subdivision lessees where legal limitations on front-end financing otherwise would prohibit or significantly deter development.".

SEC. 7. Section 6(d) of the Act is amended to read as follows:

"(d) For purposes of subsection (a) of this section, production or utilization of geothermal resources in commercial quantities shall be deemed to include the completion of one or more producing or producible wells and either a bona fide sale for delivery to a facility or facilities installed or to be installed not later than fifteen years from the commencement date of the lease, or in the case of utilization by the lessee, proof of commitment to construct such utilization facilities. However, in the event construction of the facility or facilities has not been possible due to administrative delays beyond the control of the lessee or due to the demonstrated marginal economics of such a facility or facilities, and substantial investment in development of the lease has been made, the Secretary will consider an additional extension of the extended primary lease term of up to 10 years: *Provided,* That the lessee be required to submit annual reports detailing bona fide efforts to resolve the administrative delays or to bring the facility or facilities into economic production.".

SEC. 8. Section 7 of the Act is amended to read as follows:

"SEC. 7. (a) A geothermal lease shall embrace a reasonably compact area of not more than two thousand five hundred and sixty acres, except where a departure therefrom is occasioned by an irregular subdivision or subdivisions. No person, association, or corporation, except as otherwise provided in this Act, shall take, hold, own, or control at any one time, any direct or indirect interest in Federal geothermal leases in any one State exceeding fifty-one thousand two hundred acres.

"(c) Any leases which contain a well shown to be capable of commercial production and any lease operated under an approved operating, drilling, or development contract as authorized under section 18 of this Act shall be excepted in determining holdings or control under this section.".

SEC. 9. Section 8(a) of the Act is amended to read as follows:

"SEC. 8. (a) The Secretary may adjust the terms and conditions, except as otherwise provided herein, of any geothermal lease issued under this Act at not less than twenty-year intervals beginning twenty years after the date production is commenced, as determined by the Secretary. Each geothermal lease issued under this Act shall provide for such readjustment. The Secretary shall give notification of any proposed readjustment of terms and conditions, and, unless the lessee files with the Secretary objection to the proposed terms or relinquishes the lease within thirty days after receipt of such notice, the lessee shall conclusively be deemed to have agreed with such terms and conditions. If the lessee files objections, and no agreement can be reached between the Secretary and the lessee within a period of not less than sixty days, the lease may be relinquished by the lessee, or following appropriate judicial proceedings, canceled by the Secretary.".

SEC. 10. Section 15(b) of the Act is amended to read as follows:

"(b) The Secretary shall consult with the head of any other Federal agency or department with respect to lands under its jurisdiction to determine appropriate terms or conditions prior to issuing leases for such lands. However, as to acquired lands of other Federal agencies or departments, the Secretary shall not issue leases on those lands without the consent of the head of that agency or department. The head of the Federal agency or department which administers any land which is subject to a geothermal lease or which is available for geothermal leasing, shall, in making land use decisions regarding such land or adjacent lands, consider their potential for geothermal resource development.".

SEC. 11. Section 15 of the Act is amended by adding a new subsection (f) to read as follows:

"(f)(1) With respect to lands within national parks or monuments, the Secretary shall identify within one hundred and eighty days after enactment of the Geothermal Steam Act Amendments of 1983, and publish in the Federal Register, a list of nationally significant thermal features located on such lands, and shall periodically update such list to include newly emergent or newly discovered nationally significant thermal features, thermal features which gain national significance through changes in patterns of their use or of their perceived scientific importance, and nationally significant thermal features of new national parks, or monuments. The Secretary's determination shall be by formal rulemaking with a complete description of such feature and a full justification for its designation. The Secretary shall submit his determinations to the Congress. The Secretary will in such publication describe geographic zones outside the boundaries of national parks and monuments where development of geothermal resources may affect nationally significant thermal features, based on review of presently available data or reasonable inferences therefrom, and may, from time to time, amend the boundaries of such zones in conformity to newly available data. Any designation pursuant to this section may be reviewed, modified, and revoked upon the determination that new information or circumstances support such action. For the purpose of this subsection, the term "nationally significant thermal feature" means a natural surface manifestation of geothermal activity or a complex of such manifestations, which is a feature the park unit involved was intended in its establishment to protect, or which has since been recognized as a park resource of national significance.

"(2) The Secretary may issue geothermal leases on Federal lands within geographic zones described pursuant to paragraph (1) only upon review of the best geological, hydrological, and other relevant evidence reasonably obtainable and only upon his determination that exploration activities pursuant to a geothermal lease on such Federal lands will not have a foreseeably significant adverse effect on nationally significant geothermal features. The Secretary may further impose conditions and stipulations in such leases necessary to limit activities to those which will not so affect nationally significant thermal features. Any lease in effect within the geographic zone established pursuant to a designation of a nationally significant thermal feature pursuant to (1) above as of the date of the determination by the Secretary of such designation shall be exempt from the application of this subsection.

"(3) Subject to valid existing loans, grants, and licenses, a department or agency of the United States shall not grant or issue a loan, grant, or license required for the exploration or development of geothermal resources within the geographic zones identified, or on non-Federal lands within national park or monument boundaries, unless the department or agency, following consultation with the Secretary of the Interior, determines, in accordance with the standards, provisions, limitations, and authorities applied above to geothermal leases on Federal lands, that activities so assisted would not have a foreseeably significant adverse effect on nationally significant thermal features.

"(4) Prior to the issuance of any geothermal leases in a zone defined in this subsection adjacent to Yellowstone National Park, Mount Rainier National Park or Lassen Volcanic National Park, the Secretary of the Interior shall determine that (1) a valuable geothermal resource exists and (2) development of the potential geothermal resource will not adversely affect the thermal features of these parks.".

"(5)(A) The Secretary shall not issue any geothermal lease pursuant to this Act in the Island Park Known Geothermal Resource Area adjacent to Yellowstone National Park until the requirements of paragraph (B) have been met.

"(B) Within two years from the date of enactment of this Act, the Secretary is authorized and directed to complete a study to determine whether any thermal geological connection exists between the Island Park KGRA and the thermal features of Yellowstone National Park. In addition, the study shall include an evaluation of and recommendation for monitoring techniques and operating procedures which may be employed in conjunction with any geothermal leasing in the Island Park KGRA, to protect the thermal features of Yellowstone National Park. The study shall be conducted by the United States Geological Survey in consultation with the National Academy of Sciences and the National Park Service. Upon completion of the study, which shall include the findings and recommendations of the Geological Survey and comments by the National Academy of Sciences and the National Park Service, it shall be transmitted forthwith to the Senate Committee on Energy and Natural Resources and the House Committee on Interior and Insular Affairs and made available to the public;

"(C) Sixty days (not counting days on which the House of Representatives or Senate was adjourned for more than three days) after completion of the study required by paragraph (B), the Secretary may issue geothermal leases in the Island Park KGRA, if he determines that: (1) a valuable geothermal resource exists; (2) development of the potential geothermal resource will not adversely affect the thermal features of Yellowstone National Park; and (3) after the study, that such leasing will be consistent with the Secretary's duty to protect the thermal features of the park. Costs of any monitoring or operational procedures determined by the Secretary to be necessary shall be borne by the lessee or lessees;

"(D) Effective October 1, 1983, there are hereby authorized such sums as may be necessary to carry out the study provided for in paragraph (B).".

SEC. 12. Section 23 of the Act is amended by adding after subsection (b) the following:

"(c) Where the Secretary finds it in the public interest, the Secretary is authorized, subject to section 15(c), to issue permits for the use of geothermal resources in lands administered by him for any noncommercial application without requiring a lease or compensation therefor. No such free use permit may be issued for the purpose of generating electricity in any amount.

"(d) In any case in which the Federal interest in any geothermal energy research and development facility, pilot plant, or demonstration facility which utilizes geothermal resources from lands subject to the provisions of this Act is transferred to any person, corporation, municipality, or agency, the Secretary is authorized, notwithstanding any other provision of this Act, to issue at no cost, a permit allowing necessary surface use and utilization of geothermal resources sufficient, in the Secretary's opinion, for the continued operation of such plant or facility for the operating life of the project.

"(e) The head of each Federal agency may develop for the use or benefit of such agency any geothermal energy resource within lands under its jurisdiction. The head of such agency shall determine in writing, with the concurrence of the Department of the Interior, that such utilization is in the public interest, and will not deter commercial development which might otherwise be more beneficial to the public if the lands were offered for leasing under this Act.".

SEC. 13. Section 24 of the Act is amended by designating the existing text as subsection (a) and adding the following:

"(b) The Secretary shall establish requirements for diligent operations which shall require that a plan of operations for exploration shall be filed within three years of the issuance of a lease. The diligence requirements shall also provide that drilling shall commence no later than two years after approval of such plan or two years after a drilling permit has been approved, whichever is later. The Secretary may provide for the aggregation of diligence requirements on lease tracts within a geothermal prospect. The running time of the diligence requirements established in this subsection shall be suspended for periods of unreasonable delay caused by a lessee's inability to obtain State or Federal permits (with the exception of permits issued by the Department of the Interior) through no fault of his own.".

SEC. 14. A new section is added to the Act as follows:

"SEC. 28. For purposes of section 4(d)(3) of the Wilderness Act of 1964 (16 U.S.C. 1131 et seq.), this Act, as amended, shall be deemed a law pertaining to mineral leasing.".

SEC. 15. The Act is further amended by making the following technical changes:

(a) Section 2(c) of the Act is amended by striking out "steam and associated geothermal" and by inserting after "brines" in the first place it appears, the following: "geopressured water, magma, and hot rock formations".

(b) Section 2(d) of the Act is amended by striking out "steam" in both places it appears and inserting in lieu thereof "resources".

(c) Section 3 of the Act is amended by striking out "steam and associated geothermal" in both places it appears.

(d) Section 5(d) of the Act is amended by striking out "steam and byproduct" and inserting in lieu thereof "resources".

(e) Section 6(a) of the Act is amended by striking out "steam is" in both places it appears and inserting in lieu thereof "resources are".

(f) Section 6(b) of the Act is amended by striking out "steam is" and inserting in lieu thereof "geothermal resources are".

(g) Section 6(c) of the Act is amended by striking out "steam is" in the first place it appears and inserting in lieu thereof "resources are," and by striking out "steam is" in the second place it appears and inserting in lieu thereof "geothermal resources are".

(h) Sections 6 (d) and (e) of the Act are amended by striking out "steam" in each place it appears and inserting in lieu thereof "resources".

(i) Section 6(f) of the Act is amended by striking out "steam and associated geothermal".

(j) Section 8 of the Act is amended by striking out "steam is" in both places it appears and inserting in lieu thereof "resources are".

(k) Section 9 of the Act is amended by striking out "steam" and inserting in lieu thereof "resources".

(l) Section 19 of the Act is amended by striking out "steam" and inserting in lieu thereof "resources".

(m) Section 23 of the Act is amended by striking out "steam and associated geothermal" in both places it appears.

(n) Section 25 of the Act is amended by striking out "steam and associated geothermal".

(o) Section 26 of the Act is amended by striking out "steam and associated geothermal".

(p) Section 27 of the Act is amended by striking out "steam and associated geothermal" in the three places it appears.

○

II

98TH CONGRESS
1ST SESSION

S. 883

To amend the Geothermal Steam Act of 1970 (30 U.S.C. 1001 et seq.) to expedite exploration and development of geothermal resources.

IN THE SENATE OF THE UNITED STATES

MARCH 22 (legislative day, MARCH 21), 1983

Mr. MCCLURE (for himself, Mr. WARNER, Mr. LAXALT, Mr. HECHT, Mr. SYMMS, and Mr. WALLOP) introduced the following bill; which was read twice and referred to the Committee on Energy and Natural Resources

---

A BILL

To amend the Geothermal Steam Act of 1970 (30 U.S.C. 1001 et seq.) to expedite exploration and development of geothermal resources.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Geothermal Steam Act of 1970 (30 U.S.C. 1001 et seq.) is amended as follows:

SECTION 1. This Act may be cited as the "Geothermal Steam Act Amendments of 1983".

SEC. 2. Whenever an amendment or repeal contained in this Act is expressed in terms of amendment to, or repeal of, a section or other provision of "the Act", such reference shall be considered a reference to an amendment to, or repeal of, a provision of the Geothermal Steam Act of 1970 (30 U.S.C. 1001 et seq.; Public Law 91–581).

SEC. 3. Section 2(e) of the Act is amended to read as follows:

"(e) 'known geothermal resource area' means an area in which there is substantial physical evidence including but not limited to the geology or a discovery on such lands, which would, in the opinion of the Secretary, engender a belief in persons experienced in the subject matter that the prospects for extraction of geothermal resources for the primary purpose of generating electricity in commercial quantities warrant substantial expenditures for that purpose.".

SEC. 4. Section 3(2) of the Act is amended to read as follows: "(2) in any lands administered by another Federal agency or department, including public, withdrawn, or acquired lands.".

SEC. 5. Section 4 of the Act is amended—

(a) by deleting the first two sentences, and inserting in lieu thereof the following:

"SEC. 4. (a) If lands to be leased under this Act are within any known geothermal resource area, they shall be leased to the highest responsible qualified bidder by competitive bidding. Any lands so offered and receiving no bids shall be declassified and leased to the first qualified applicant: *Provided*, That the Secretary's authority to reclassify such lands as a known geothermal resource area at a later date on the basis of new evidence shall not be affected. The Secretary may offer not to exceed 5 per centum of all lands offered for sale in any year on a basis other than cash bonus bidding, employing those bidding systems set forth in section 8(a)(1) of the Outer Continental Shelf Lands Act, as amended (43 U.S.C. 1335). The provisions of this subsection shall expire on December 31, 1987.

"(b) If the lands to be leased are not within any known geothermal resource area, the qualified person first making application for the lease shall be entitled to a lease of such lands without competitive bidding, provided the lands applied for are not designated as a known geothermal resource area within one year of the application being filed and before a lease is issued. If an application is rejected due to a known geothermal resource area designation of the lands within one year of the application being filed, the applicant shall have the opportunity to match the highest competitive bid for the parcel when offered, provided the applicant submits a bona fide bid at the sale. However, the applicant or lessee responsible for the exploration resulting in the designation of lands as a known geothermal resource area shall be entitled to noncompetitive leases for all lands in the known geothermal resource area for which the applicant or lessee had first-filing applications on file prior to the approval of any plan of exploration or notice of intent to conduct geophysical exploration.".

(b) by inserting "(c)" before the word "Notwithstanding" at the beginning of the next sentence; and

(c) by redesignating subsections "(a)" through "(f)" as paragraphs "(1)" through "(6)".

SEC. 6. Section 5(a) of the Act is amended to read as follows:

"(a) a royalty of not less than 10 per centum or more than 15 per centum in the case of electrical generation, or of not less than 5 per centum or more than 10 per centum in the case of nonelectrical utilization, of the amount or value, as utilized, of steam, heat, or other form of energy derived from production under the lease and sold or utilized by the lessee or reasonably susceptible to sale or utilization by the lessee. The Secretary may defer royalty payments for nonelectric geothermal developments when it is deemed to be in the public interest, for municipal, cooperative, or other political subdivision lessees where legal limitations on front-end financing otherwise would prohibit or significantly deter development.".

SEC. 7(a). Section 6(a) of the Act is amended to read as follows:

"(a) Geothermal leases shall be for a primary term of ten years. If geothermal resources are produced or utilized in commercial quantities within this term, or any administrative extension thereof as provided pursuant to subsection (c), such lease shall continue for so long thereafter as geothermal resources are produced or utilized in commercial quantities.".

(b) Section 6(b) of the Act is deleted, section 6(c) is redesignated 6(b) and is revised to read as follows:

"(b) Any lease for land on which, or for which under an approved cooperative or unit plan of development or operation, actual drilling operations are commenced prior to the end of its primary term, or any administrative extension thereof as provided in subsection (c), and are being diligently prosecuted at that time shall be extended for five years and so long thereafter as geothermal resources are produced or utilized in commercial quantities.".

(c) Section 6(d) of the Act is redesignated 6(c) and amended to read as follows:

"(c) For purposes of subsection (a) of this section, production or utilization of geothermal resources in commercial quantities shall be deemed to include the completion of one or more producing or producible wells and either a bona fide sale for delivery to a facility or facilities installed or to be installed not later than fifteen years of the commencement date of the lease, or in the case of utilization by the lessee, proof of commitment to construct such utilization facilities. However, in the event construction of the facility or facilities has not been possible due to administrative delays beyond the control of the lessee or due to the demonstrated marginal economics of such a facility or facilities, and substantial investment in development of the lease has been made, the Secretary shall upon petition by the lessee, grant extensions totaling not more than fifteen years beyond the expiration date of the primary lease: *Provided,* That the lessee be required to submit annual reports detailing bona fide efforts to resolve the administrative delays or to bring the facility or facilities into economic production.".

SEC. 8. Section 7 of the Act is amended to read as follows:

"SEC. 7. (a) A geothermal lease shall embrace a reasonably compact area of not more than two thousand five hundred and sixty acres, except where a departure therefrom is occasioned by an irregular subdivision or subdivisions. No person, association, or corporation, except as otherwise provided in this Act, shall take, hold, own, or control at any one time, any direct or indirect interest in Federal geothermal leases in any one State exceeding fifty-one thousand two hundred acres.

"(b) At any time after twenty years from the effective date of the Geothermal Steam Act of 1970, the Secretary, after public hearings, may increase this maximum holding in any one State by regulation, not to exceed one hundred fifteen thousand two hundred acres.

"(c) Any leases which contain a well shown to be capable of commercial production and any lease operated under an approved operating, drilling, or development contract as authorized under section 18 of this Act shall be excepted in determining holdings or control under this section.".

SEC. 9. Section 8(a) of the Act is amended to read as follows:

"SEC. 8. (a) The Secretary may adjust the terms and conditions, except as otherwise provided herein, of any geothermal lease issued under this Act at not less than twenty-year intervals beginning twenty years after the date production is commenced, as determined by the Secretary. Each geothermal lease issued under this Act shall provide for such readjustment. The Secretary shall give notification of any proposed readjustment of terms and conditions, and, unless the lessee files with the Secretary objection to the proposed terms or relinquishes the lease within thirty days after receipt of such notice, the lessee shall conclusively be deemed to have agreed with such terms and conditions. If the lessee files objections, and no agreement can be reached between the Secretary and the lessee within a period of not less than sixty days, the lease may be relinquished by the lessee, or following appropriate judicial proceedings, canceled by the Secretary.".

SEC. 10. Section 15(b) of the Act is amended to read as follows:

"(b) The Secretary shall consult with the head of any other Federal agency or department with respect to lands under its jurisdiction to determine appropriate terms or conditions prior to issuing leases for such lands. However, as to acquired lands of other Federal agencies or departments, the Secretary shall not issue leases on those lands without the consent of the head of that agency or department. The head of the Federal agency or department which administers any land which is subject to a geothermal lease or which is available for geothermal leasing, shall, in making land-use decisions regarding such land or adjacent lands, consider their potential for geothermal resource development.".

SEC. 11. Section 15 of the Act is amended by adding a new subsection (f) to read as follows:

"(f)(1) The Secretary shall not issue any geothermal lease pursuant to this Act in the Island Park Known Geothermal Resource Area adjacent to Yellowstone National Park until the requirements of paragraph (2) have been met.

"(2) Within two years from the date of enactment of this Act, the Secretary is authorized and directed to complete a study to determine whether any thermal geological connection exists between the Island Park KGRA and the thermal features of Yellowstone National Park. In addition, the study shall include an evaluation of and recommendation for monitoring techniques and operating procedures which may be employed in conjunction with any geothermal leasing in the Island Park KGRA, to protect the thermal features of Yellowstone National Park. The study shall be conducted by the United States Geological Survey in consultation with the National Academy of Sciences and the National Park Service. Upon completion of the study, which shall include the findings and recommendations of the Geological Survey and comments by the National Academy of Sciences and the National Park Service, it shall be transmitted forthwith to the Senate Committee on Energy and Natural Resources and the House Committee on Interior and Insular Affairs and made available to the public;

"(3) Sixty days (not counting days on which the House of Representatives or Senate was adjourned for more than three days) after receipt of the study required by paragraph (2), by the appropriate committees the Secretary may issue geothermal leases in the Island Park KGRA, if he determines that: (A) a valuable geothermal resource exists; (B) development of the potential geothermal resource will not adversely affect the thermal features of Yellowstone National Park; and (C) after considering the finding and recommendations of the study, that such leasing will be consistent with the Secretary's duty to protect the thermal features of the park. Costs of any monitoring or operational procedures determined by the Secretary to be necessary shall be borne by the lessee or lessees;

"(4) Effective October 1, 1983, there are hereby authorized such sums as may be necessary to carry out the study provided for in paragraph (2).".

SEC. 12. Section 23 of the Act is amended by adding after subsection (b) the following:

"(c) Where the Secretary finds it in the public interest, the Secretary is authorized, subject to section 15(c), to issue permits for the use of geothermal resources in lands administered by him for any noncommercial application without requiring a lease or compensation therefor. No such free-use permit may be issued for the purpose of generating electricity in any amount.

"(d) In any case in which the Federal interest in any geothermal energy research and development facility, pilot plant, or demonstration facility which utilizes geothermal resources from lands subject to the provisions of this Act is transferred to any person, corporation, municipality, or agency, the Secretary is authorized, notwithstanding any other provision of this Act, to issue at no cost, a permit allowing necessary surface use and utilization of geothermal resources sufficient, in the Secretary's opinion, for the continued operation of such plant or facility for the operating life of the project.

"(e) The head of each Federal agency may develop for the use or benefit of such agency any geothermal energy resource within lands under its jurisdiction. The head of such agency shall determine in writing, with the concurrence of the Department of the Interior, that such utilization is in the public interest, and will not deter commercial development which might otherwise be more beneficial to the public if the lands were offered for leasing under this Act.".

SEC. 13. Section 24 of the Act is amended by designating the existing text as subsection (a) and adding the following:

"(b) The Secretary shall establish requirements for diligent operations which shall require that a plan of operations for exploration shall be filed within five years of the issuance of a lease. The diligence requirements shall also provide that drilling shall commence no later than four years after approval of such plan. The Secretary may provide for the aggregation of diligence requirements on lease tracts within a geothermal prospect. The running time of the diligence requirements established in this subsection shall be suspended for periods of unreasonable delay caused by a lessee's inability to obtain State or Federal permits (with the exception of permits issued by the Department of the Interior) through no fault of his own.".

SEC. 14. A new section is added to the Act as follows:

"SEC. 28. For purposes of section 4(d)(3) of the Wilderness Act of 1964 (16 U.S.C. 1131 et seq.), this Act, as amended, shall be deemed a law pertaining to mineral leasing.".

SEC. 15. The Act is further amended by making the following technical changes:

(a) Section 2(c) of the Act is amended by striking out "steam and associated geothermal" and by inserting after "brines" in the first place it appears, the following: "geopressured water, magma, and hot rock formations".

(b) Section 2(d) of the Act is amended by striking out "steam" in both places it appears and inserting in lieu thereof "resources".

(c) Section 3 of the Act is amended by striking out "steam and associated geothermal" in both places it appears.

(d) Section 5(d) of the Act is amended by striking out "steam and byproduct" and inserting in lieu thereof "resources".

(e) Section 6(a) of the Act is amended by striking out "steam is" in both places it appears and inserting in lieu thereof "resources are".

(f) Section 6(b) of the Act is amended by striking out "steam is" and inserting in lieu thereof "geothermal resources are".

(g) Section 6(c) of the Act is amended by striking out "steam is" in the first place it appears and inserting in lieu thereof "resources are," and by striking out "steam is" in the second place it appears and inserting in lieu thereof "geothermal resources are".

(h) Sections 6 (d) and (e) of the Act are amended by striking out "steam" in each place it appears and inserting in lieu thereof "resources".

(i) Section 6(f) of the Act is amended by striking out "steam and associated geothermal".

(j) Section 8 of the Act is amended by striking out "steam is" in both places it appears and inserting in lieu thereof "resources are".

(k) Section 9 of the Act is amended by striking out "steam" and inserting in lieu thereof "resources".

(l) Section 19 of the Act is amended by striking out "steam" and inserting in lieu thereof "resources".

(m) Section 23 of the Act is amended by striking out "steam and associated geothermal" in both places it appears.

(n) Section 25 of the Act is amended by striking out "steam and associated geothermal".

(o) Section 26 of the Act is amended by striking out "steam and associated geothermal".

(p) Section 27 of the Act is amended by striking out "steam and associated geothermal" in the three places it appears.

DEPARTMENT OF AGRICULTURE
OFFICE OF THE SECRETARY
WASHINGTON, D. C. 20250

June 3 1983

Honorable James A. McClure
Chairman, Committee on Energy and
Natural Resources
United States Senate
Washington, D.C. 20510

SENATE COMMITTEE ON
ENERGY AND NATURAL RESOURCES
RECEIVED
JUN 8 1983
WASHINGTON, D.C. 20510

Dear Mr. Chairman:

As you requested, here is our report on S. 558 and S. 883, bills "To amend the Geothermal Steam Act of 1970 (30 U.S.C. 1001 and et seq.) to expedite exploration and development of geothermal resources."

The Department of Agriculture would have no objection to the enactment of S. 558 or S. 883 if amended as indicated herein.

The Forest Service administers about 191 million acres of National Forest System (NFS) lands. These lands include many of the most promising geothermal areas. Section 15(b) of the Geothermal Steam Act of 1970 provides that NFS lands may be leased by the Secretary of the Interior, subject to the consent of the Secretary of Agriculture and subject to special terms or conditions that he may prescribe. The Forest Service has an active program for determining if specific lands should be leased and if special conditions are necessary to protect National Forest purposes and uses. Admittedly, this task is often difficult and time-consuming because of the commonly perceived conflict between geothermal development and some surface resources. Some of the most promising geothermal areas on NFS lands are near National Parks or are areas of the National Forests highly valued for their scenic, wildlife, recreational, and water resources. These bills specifically address areas where the consideration of geothermal leasing has been highly publicized and very controversial.

The majority of the provisions of the bills deal with technical matters on which we defer to the Department of the Interior for comment. We do, however, wish to comment on several provisions of importance to the management of the NFS lands. The following comments apply to both bills.

Section 15(b) of the Geothermal Steam Act provides that the Secretary of Agriculture must consent before NFS lands can be leased, and that he may require special terms and conditions to insure adequate protection of the lands for National Forest purposes. Section 10 of the proposed amendment would remove this requirement and provide only for consultation between the Secretary of the Interior and other surface managing agencies before lands administered by the other agencies could be leased--except that lands acquired by another agency could be leased only with that agency's consent. This proposed change is unsatisfactory to USDA. Geothermal operations could significantly affect other important uses and resources for which USDA and other agencies are responsible. This could be true for lands reserved from the public domain as well as for acquired lands. The proposed amendment seems to be modeled after the terms of the 1920 Leasing Act and the 1947 Leasing Act for Acquired Lands relative to oil and gas. Geothermal leasing has the potential for greater disruption of multiple-use management of the lands than oil and gas leasing because of the provision for onsite geothermal use or conversion. The terms of the 1920, 1947, and 1970 Acts show an evolution of the role of the surface managing agency. We believe it would be inappropriate to return to concepts of the 1920 Act, which has been augmented by interagency agreements to solve jurisdictional problems.

We are very much aware of the need to insure that important thermal features of the National Parks are protected. While we believe such protection can be provided under existing regulatory procedures, we defer to the Department of the Interior in regard to analysis of the specific proposals provided in Section 11.

As presently written, Section 12(c), which would allow the Secretary of the Interior to issue free permits for noncommercial uses other than electricity generation, does not apply to NFS lands. We support the exclusion of NFS lands from this provision. We believe that there should be reasonable user fees for the use of National Forest resources.

Section 14 provides that geothermal resources are covered by Section 4(d)(3) of the Wilderness Act of 1964. This would essentially provide that lands in the Wilderness System could be leased under terms of the Geothermal Steam Act through December 31, 1983, after which the lands would be withdrawn from geothermal leasing. We have no opposition to this proposal, but since we are prevented from processing lease applications by Section 308 of the 1983 Appropriations Act, this may be a moot issue.

We have provided as a part of this statement a written supplement containing technical and editorial suggestions.

The Office of Management and Budget advises that there is no objection to the presentation of this report from the standpoint of the Administration's program.

Sincerely,

John R Block

John R. Block
Secretary

Enclosure

SUPPLEMENTAL STATEMENT
TO
S. 558 and S. 883

Section 6, both bills: The apparent intent of this section could be clarified by removing the words "as utilized" in line 15, page 4; and substituting "based on the type of use."

Section 8, both bills: We suggest that subsection (c) be reworded to read "Any lease which contains a well. . . ." to prevent a single producing well from exempting a block of leases from acreage limitations. There should be new language to repeal the last sentence of Section 18 of the act because that provision is moved to Section 7(c) by this bill.

Senator **Warner**. In deference to the ranking minority member, I would like to read one paragraph, which I think is very pertinent:

> The only issue that gives me deep concern is the protection of the nationally significant thermal features of our national parks and monuments. These thermal features, such as Old Faithful in Yellowstone National Park and the hot springs in Mount Rainier National Park, are a unique and irreplaceable part of any visit to one of our national parks or monuments.

I certainly share in that concern. Let us hope the work in the subcommittee and the full committee will achieve that goal.

We will have as our first witness today Mr. Petty, Deputy Director for Management Services, Bureau of Land Management.

STATEMENT OF ARNOLD E. PETTY, DEPUTY DIRECTOR, MANAGEMENT SERVICES, BUREAU OF LAND MANAGEMENT, DEPARTMENT OF THE INTERIOR

Mr. **Petty**. Thank you, Mr. Chairman. I appreciate the opportunity to appear here to discuss S. 558 and S. 883, the bills that you described in your opening statement. I have a prepared statement which is rather lengthy and with your permission, I would like to insert it in the record.

Senator **Warner**. Your statement will be included in its entirety.

Mr. **Petty**. And I will attempt as best I can to summarize that statement. S. 558 and S. 883 were considered by the 97th Congress as S. 669 and S. 1516. Testimony before this committee in that Congress indicated the national need for the objective and strong support for this legislation.

Passage of time has only increased the awareness of the need for the legislation which is so vital for the exploration and development of this Nation's geothermal resources. Section 8 of both bills is probably the most important section we have to deal with, since it increases the acreage limitation from 20,480 acres to 51,200.

S. 883 would authorize the Secretary of the Interior to increase the acreage to 115,200 acres after December 24, 1990. This provision appears to have been inadvertently omitted in S. 558, at least I cannot find any indication that it was a purposeful omission. It appears to have been inadvertent.

Without this increase in the acreage limitation, we estimate that 3 million acres will not be leased, including 1.7 million acres for which we currently have applications. I note with interest, Mr. Chairman, in your own home State as well as my own, we are already up against the acreage limitation. This is a problem that we are facing nationwide.

Section 3 of both bills provides a more restrictive definition of a known geothermal resource area. When we look back over the success we have had with the 1970 act, we really do not see a need to redefine KGRA in legislation so we would prefer not to see that in this bill. I discussed that in quite a bit more detail in my prepared statement.

Section 5 of both bills provides that if no bids are received at one competitive sale that the area is to be declassified and leased noncompetitively to the first applicant.

We believe, Mr. Chairman, that the reclassification should remain flexible as it is now. In some cases, it may be desirable to offer the area competitively more than once, rather than just offer it once, and then if it is not sold to go noncompetitive.

About 70 percent of the tracts that we have put up a second time have received no bids, but 30 percent have received bids of several million dollars. So we believe that flexibility in putting tracts up competitively more than once has some merit to it.

S. 558 provides for a variation in the cash bonus bidding system by using those experimental systems that have been tried on the OCS. Most of the competitive sales in the geothermal program have been completed. There is about one-half million—600,000 acres, I believe, to be exact—still left to be leased. We believe it is a little late in the game to go to an experimental bidding system.

The cash bonus system is still used extensively in the OCS program and we believe it is still one of the best systems to bring in fair market value.

Senator **Warner**. Let me interrupt for a minute. Many folks have come a great distance to hear you. Are you able to bear clearly in the back? I was fearful of that.

Mr. **Petty**. Maybe if I talk a little closer to the mike.

S. 558 provides for variation in the cash bonus system as I described earlier.

Now, section 5 of S. 883 provides for much the same sort of experimental bidding system, but it only goes through December 31, 1987. As I said earlier, we really do not see a need to try a different bidding system at this late stage in the game.

S. 558 would set aside 10 percent of the tract for public bodies. We are just not in favor of the set-aside, Mr. Chairman. We have only had one public body, which I am aware of, that has ever expressed an interest in the geothermal resource. That municipality came in and bid competitively and did get its tract and had it developed.

But in most cases the development of geothermal resource is a very risky, very expensive operation for a municipality to get into and it is our impression that they would prefer, and we would definitely prefer, to see the private sector get in and develop that resource and sell it to the municipalities. So for that reason we would object to the 10-percent set-aside.

We favor the provision in both bills that would prevent the rejection of noncompetitive leases that have been pending for more than 1 year where the KGRA classification occurs during that period of time. We think that rarely happens. We have eliminated our backlog and we believe that we can take care of our leases in the future within the 90-day timeframe. But we are certainly in favor of that provision. If some lease, for whatever reason, should be pending before us for more than a year and a KGRA classification occurred within that time, then we would favor the acceptance of that application.

Section 4 of both bills increases the amount of land which may be leased by extending the leasing authority to other agencies, such as the Defense Department. Now, parks, wildlife refuges, recreation areas, travel, and Indian lands would be excluded. There is a specific exclusion provided for that.

We are in favor of this extension to lands administered by agencies such as TVA, the Department of Defense, and other agencies.

However, we believe that the bill should provide for approval by the other agencies in order that they can advise us of stipulations that should be put into the lease to protect the land for the purpose for which the agency is administering it.

We favor section 7 of both bills, which would allow an additional extension of the primary lease terms. Basically, what we have now is that they can go up to 15 years. Under these bills, they could go to 25 years.

Section 9 of both bills provides for readjustment at 20-year intervals rather than the present 10-year intervals. Mr. Chairman, we believe that the 10-year interval is still the best provision. If there is no need, no adjustment has to be made, but it does give the Secretary of the Interior the opportunity to adjust it more frequently and to take into account economic changes.

S. 558 provides additional language dealing with national parks and monuments and you spoke to that earlier in Mr. Jackson's statement. We believe that parks and monuments are well protected. However, in view of the controversy surrounding the parks that you mentioned earlier, we would have no objection to the extension of additional protection to Lassen Volcanic National Park and Yellowstone. As currently drawn, both S. 558 and S. 883 would require an extremely expensive program with regards to other parks, including areas where we would have to do deep exploration drilling, numerous confirmation wells, and flow testing to determine whether geothermal leasing would affect a thermal feature.

We would ask the committee to look very carefully at the cost before requiring us to go into this testing program, which is set out in the bill.

Section 13 of both bills would establish diligence requirements. S. 558 would require a plan of exploration within 3 years and drilling within 2 years after the plan is approved. S. 883 would require a plan within 5 years and drilling within 4 years after the plan is approved.

We believe that the regulations we currently have, which provide for a graduated level of required expenses is the preferred diligence requirement rather than a legislatively forced drilling plan.

Mr. Chairman, those are basically the highlights of my prepared statement. I would be happy to try to answer questions.

[The prepared statement of Mr. Petty follows:]

MAY 2 1983

STATEMENT OF ARNOLD E. PETTY, DEPUTY DIRECTOR, MANAGEMENT SERVICES, BUREAU OF LAND MANAGEMENT, DEPARTMENT OF THE INTERIOR, BEFORE THE SUBCOMMITTEE ON ENERGY AND MINERAL RESOURCES, COMMITTEE ON ENERGY AND NATURAL RESOURCES, UNITED STATES SENATE, ON S. 558 and S. 883, BILLS "TO AMEND THE GEOTHERMAL STEAM ACT OF 1970 (30 U.S.C. 1001 et seq.) TO EXPEDITE EXPLORATION FOR AND DEVELOPMENT OF GEOTHERMAL RESOURCES."

I appreciate the opportunity to appear here today to discuss S. 558 and S. 883, bills to amend the Geothermal Steam Act of 1970 to expedite the exploration for and development of geothermal resources.

The Department not only supports the goals of this legislation but also recognizes an urgency for its enactment, particularly in light of its benefits in terms of aiding economic recovery and developing additional domestic energy supplies. With certain changes which we will suggest, we believe the bills will increase the availability, development and utilization of publicly-owned geothermal resources.

Over 50 percent of the geothermal resource in the United States exists on Federal lands. If the substantial potential for energy production is to be achieved, it is clearly essential that there be an aggressive program for making Federal lands available for geothermal development. Accordingly, the Department of the Interior has reviewed all aspects of the Federal leasing program to streamline administrative procedures. One result of this review is the final rulemaking of April 20, 1983, which removed burdensome and counterproductive regulatory requirements.

However, certain legislative changes are needed if our efforts are to be successful. S. 558 and S. 883 provide the changes that we believe are necessary to encourage development of the Federal geothermal resource, while also to some extent increasing revenues. The most important provisions contained in the two bills are those in section 8 which would increase the per State acreage limitation from 20,480 to 51,200 acres. S. 883 would also authorize the Secretary of the Interior to increase the 51,200-acre limitation to 115,200 acres after December 24, 1990.

Limitations imposed by the Geothermal Steam Act of 1970 have stifled not only the development of geothermal resources but also the development of new technology and techniques, because they discourage corporations from even participating in the Federal geothermal program. At present there are approximately 3.3 million acres under noncompetitive lease application. Only 1.6 million acres can be accepted by applicants because of the current 20,480 acre limit. Another 1.9 million acres in relinquished leases will be made available beginning in May, and approximately 600,000 acres in unleased Known Geothermal Resource Areas will soon either be offered for sale or reclassified and made available for noncompetitive leasing. Based on these figures and the current level of interest in the leasing program, we estimate that approximately 3.0 million acres of land known to be valuable or for which industry has shown interest will not be leased because of the 20,480-acre limit. If the limit were increased to 51,200 acres, we believe that all the 3.0 million acres could be leased within one year. With increased rentals and the enhanced bonus bidding that would result from the higher limit, we estimate a first year revenue increase of $4 to $6 million. Of greater importance, however, is the fact that a higher limit will encourage more companies to enter the geothermal industry. More than anything else, the 20,480-acre limit is inhibiting more widespread use of geothermal energy.

In addition to increasing the acreage limitations for geothermal leases, both bills would also except from the acreage limitation those leases shown to be capable of commercial production. This is an especially valuable provision because it will promote accelerated exploration and development of the resource.

Section 3 of both bills would provide a new, more restrictive definition of a "known geothermal resource area" (KGRA). It would remove the test of "competitive interest" as an indicator of the presence of geothermal resources in an area and would, instead, require substantial physical evidence that the area would serve the "primary purpose of generating electricity in commercial quantities." S. 558 also would make the term apply specifically to areas designated by the Secretary as a KGRA prior to October 1, 1979, as well as to the areas covered by the definition in both bills.

Under the Geothermal Steam Act of 1970, a KGRA is defined by competitive interest, nearby discoveries and geology. If, in the opinion of the Secretary, the prospects for extraction of geothermal resources are sufficient to warrant the expenditure of money for that purpose by persons experienced in geothermal matters, then the area is classified a KGRA and is leasable only under the competitive system.

We believe the intent of these changes contained in the two bills under consideration is to prevent the retention of lands in KGRA status which, when offered for sale, receive few or very low bids, which results in the lands remaining unleased.

However, we believe the present definition of a KGRA is preferable for two reasons. First, with respect to the "competitive interest" test, if lands are offered for sale and receive no bids, they can be reclassified by the Secretary based on the assumption that persons experienced in geothermal matters did not consider the prospects good enough to warrant expenditures.

Second, the more restrictive geologic test for identification of a KGRA, that is, that the area serve the primary purpose of generating electricity, may deprive the public of fair market value in two situations. In the first instance the information may not be complete enough to meet the more stringent test but, nevertheless, could show substantial potential. In the second instance there may be substantial, recognized hot water areas which would not, under current technology, generate electricity, but could support a large commercial direct thermal use project. These areas should be identified as KGRAs as the present law provides, and thus subject to competitive leasing. In this regard, Bureau of Land Management records indicate that significant bonus bids have been received from parcels offered under the existing definition of "competitive interest." Accordingly, we believe "competitive interest" should remain a criterion for establishing new KGRA's, and oppose enactment of section 4 of both bills.

Section 5 of S. 558 and S. 883 also would provide that if no bids are received on a KGRA when offered at one competitive sale, the area would be declassified and leased to the first applicant. We do not favor this amendment.

With respect to declassification upon an unsuccessful offering, we believe that reclassification of KGRAs to permit noncompetitive leasing after sufficient unsuccessful competitive offerings is not only reasonable but necessary to allow exploration of unproven acreage. However, reclassification after only one competitive offering may not, in all cases, be a sufficient test of the competitive market. Bureau of Land Management records indicate that, although over 70 percent of all parcels offered a second or third time have received no bids, the Government has received several million dollars from parcels which did receive bids on reoffering. Certainly after three offerings, and possibly after only two, parcels should be reclassified. We recognize that authority for such reclassification already exists and we intend to assign high priority to such efforts in the future.

We feel reclassification is an important component of a well-managed geothermal leasing program, but reclassification should remain flexible, as it is now, so as to allow the Secretary to determine in which instances the public would be better served by noncompetitive leasing. Therefore, we oppose section 5 of both bills.

S. 558 would provide that the Secretary shall offer at least ten percent of all lands offered for sale in any year on a basis other than cash bonus bidding, employing those bidding systems set forth in the Outer Continental Shelf Lands Act. S. 883 would provide that the Secretary may offer up to five percent in that manner and that the provisions concerning declassification and bidding system set aside would expire on December 31, 1987. S. 558 would also provide that up to ten percent of the acreage leased in any year shall be offered, on the basis of a specific application for a tract, to public bodies.

The competitive leasing phase of the Federal Geothermal Program is essentially complete. Very little valuable KGRA acreage remains to be offered. Adopting OCS bidding procedures at this late date would be cumbersome and unnecessary. The set aside for public bodies would also be cumbersome and perhaps unwise given the speculative nature of geothermal energy. Public bodies have always been capable of obtaining Federal geothermal leases but, with few exceptions, have shown little interest. We do not favor this provision. We question the purpose of the expiration date of December 31, 1987, contained in section 5 of S. 883.

Both S. 558 and S. 883 would protect from rejection based on KGRA classification, noncompetitive applications that have been pending for more than one year. We favor this provision. Although it would be rare for any new application to remain unprocessed for that length of time, protecting noncompetitive lease applications from rejection based on KGRA classification would encourage more deep exploratory drilling and reduce the time for commencement of production and subsequent royalty payments.

Another amendment which would expedite the development of geothermal resources is found in section 4 of both bills. This provision increases the amount of Federal land which the Secretary of the Interior may lease.

The Geothermal Steam Act of 1970 limits the Secretary's leasing authority to geothermal resources in lands administered by Interior or by the Forest Service, and in lands conveyed by the United States subject to a reservation to the United States of the geothermal resources. Both bills would extend the Secretary's leasing authority to "any lands administered by another Federal agency or department, including public, withdrawn, or acquired lands," subject to the continued exclusion of lands described in section 15(c) of the Act. The exclusion applies to lands in the National Park System, national recreation areas, wildlife refuges, tribal and Indian trust lands, and other lands described in section 15(c). However, we recommend that the bill be amended to insure that lands managed by Federal agencies other than Interior can be leased only with the approval of the affected agency to ensure that any leases issued include such terms and conditions deemed necessary by the agency head to protect resources that the agency might be mandated to protect. We assume that this language is not intended to be in derogation of the authority in the Act of December 24, 1970, for development of geothermal resources by the Department of Defense.

Section 7 of both bills would allow an additional extension of the extended primary lease term. We believe such a provision is necessary. Although no leases have yet run their full primary lease term, it seems likely that there will be instances where lessees have invested substantial funds in proving up a prospect only to reach the end of their lease term without actually beginning production. Such expenditures can easily exceed $70 million in the case of a 50 MW powerplant. Allowing a lease for such a property to expire would not be advantageous to anyone.

Section 8 of S. 558 contains what we believe to be a technical error. In amending section 7 of the Geothermal Steam Act, subsection (b) was omitted.

Section 9 of both bills provides for readjustment of lease terms and conditions at 20-year intervals rather than at the current 10-year interval. We believe that a 20-year interval is too long and reduces the Secretary's flexibility to respond to changing economic, technical or environmental conditions.

Section 11 of both bills pertains to protection of national parks. Both bills would direct the Secretary to complete a two-year study to determine whether there is any thermal geological connection between the Island Park KGRA and the thermal features of Yellowstone National Park.

S. 558 provides additional language dealing with national parks and monuments. The Secretary would be directed to identify and publish in the Federal Register a list of nationally significant thermal features within national parks or monuments. The determination would be by formal rulemaking with a complete description of such features and a full justification for each designation. The publication would describe geographic zones outside the boundaries of national parks and monuments where development of geothermal resources may affect nationally significant thermal features. The Secretary could then issue leases within such zones only if exploration would not have a foreseeably significant adverse effect on a listed thermal feature.

Specific zones would be required adjacent to Yellowstone, Mount Rainier, and Lassen National Parks. Before issuing any geothermal leases in these specific zones, the Secretary would be required to determine that a valuable resource exists and that development of the potential geothermal resources will not adversely affect the thermal features of the park resources.

There has been a great deal of concern over the possible effects of geothermal development near certain parks. We question whether there is a need for additional legislative protection of parks, since specific authorities and responsibilities are already mandated elsewhere. It is the responsibility of the Secretary under the law to preserve and protect the national parks of this country. Secretary Watt is fully committed to fulfilling this responsibility and to preserving park resources.

The National Park System and its thermal features are protected by existing law - particularly the organic act of the National Park System of 1916 - which strictly prohibits the Secretary from embarking on a geothermal leasing program which would damage significant park thermal resources. In all cases, before issuing a geothermal lease, a thorough environmental assessment would be prepared, thus assuring a review of the potential effects upon park resources.

Nonetheless, we would have no objection to legislation which would extend additional procedural protection to Yellowstone and Lassen Volcanic National Parks. We would support a provision similar to that contained in section 11 of H.R. 4067 of the 97th Congress, that established no-leasing buffer zones outside Yellowstone and Lassen. Such a provision would provide the public absolute assurance that their parks will not be harmed. Establishing the buffer zones by statute would place the issue beyond judicial review. However, since there has been no controversy involving parks or monuments other than Yellowstone and Lassen, we see no need to address other areas or parks in the bills. Also, the provisions of S. 558 and S. 883 with regard to parks would be expensive and inefficient to administer. To our knowledge, no amount of study with current technology can demonstrate whether there is a hydrothermal interconnection of Yellowstone and the Island Park KGRA (which amounts to 28,350 noncontiguous acres within the 488,031-acre Island Park Geothermal Area). Further, it would be extremely costly to determine whether a valuable resource exists because it would require deep exploration drilling, numerous confirmation wells and flow testing.

Section 13 of both bills would establish diligence requirements. S. 558 would require that a plan of exploration be filed within three years of lease issuance and that drilling be commenced within two years of plan approval. Such a requirement would be counterproductive. When one considers the small amount of capital being committed to geothermal development, (except at the Geysers), and the high risks involved, it is likely that such a stringent diligence requirement would lead many companies to abandon the Federal leasing program.

At present, many leases are in their sixth, seventh and eighth years. Diligence provisions in the regulations already require that in lease years six through ten, a total of $100,000 be spent on diligent exploration for a 2,500-acre lease. The requirements are that $10,000 be spent in conducting diligent exploration in the 6th year; $15,000 in the 7th year; $20,000 in the 8th year; $25,000 in the 9th year; and $30,000 in the 10th year. This provides a strong incentive for early activity.

S. 883 would require that a plan of exploration be filed within five years of lease issuance and that drilling be commenced within four years of approval. This is less stringent than the requirements in S. 558. Nevertheless, it would force drilling. Such action is unwise. Lessees are already performing diligently at a rate justified by the resource. More development will occur when the acreage limit is increased. The solution is not through forced premature drilling.

This completes my prepared statement. There are a few other issues that I have not raised today which we will discuss in detail in the Department's report to the Committee. I will be pleased to answer questions on the issues I have raised.

Senator **Warner**. Thank you very much, Mr. Petty. I have a number of questions here and I am going to go through them quickly, if you can give me brief answers and then feel free to file them for the record and there will be other questions for the record.

Mr. **Petty**. I did bring Mr. Zimmerman and Mr. Duscher, if they might help answer some of the detailed questions.

Senator **Warner**. Why don't you join Mr. Petty at the table.

Intrinsic to this whole problem, of course, is this extension from 20,000 plus to 51,000. To the extent of your knowledge, are there any groups, individuals or others who are just totally opposed to this increase?

Mr. **Petty**. Mr. Chairman, I have been associated with this geothermal program for several years. I know of no objections to that. No objection surfaced in the 97th Congress when the hearings were held on that. I know of no objections to the increased limitations.

Senator **Warner**. I would hope other witnesses would address that same question. Now, there is a question of interaction between geothermal development and national park geothermal features. To the best of your knowledge what is the greatest distance known where there has been interference in any of the world's natural geothermal surface manifestations by any geothermal development?

Mr. **Petty**. Mr. Chairman, I know that the closest we have leased to Yellowstone is some 40 miles and to my knowledge there has not been any disturbance there. Do you know of any closer period, Dale, than that?

Mr. **Zimmerman**. I am not aware of it.

Mr. **Petty**. I am not aware of anything.

Senator **Warner**. That is another question I am very much interested in if others would address it. I remember in the hearings vividly last year, there was the question in New Zealand, there was a loss. Are you familiar with that situation?

Mr. **Petty**. No, sir, I am not.

Mr. **Duscher**. Mr. Chairman, there has been a demonstrated effect up to 3 miles away from the geothermal area in New Zealand and possible effects up to 6 miles away. But I do not believe we have ever measured effects at a greater distance than that.

And also the case in New Zealand is one of massive fluid withdrawal, very large quantities of withdrawal from the formation without reinjection. The water was allowed to flow into the river. This would not be operating practice in the United States. We would not do that in the interest of the environment.

Senator **Warner**. You have raised objection to provisions in the bills before us calling for only consultation with our agencies on geothermal leasing. You have recommended that other affected agencies must grant approval before there is leasing of resources on lands which those agencies manage.

Would you be agreeable to the placing of a maximum time limit for the processing of lease and permit application by other affected surface management agencies which would minimize as much as possible the current delay from these other agencies' input?

Did you get the thrust of that?

Mr. **Petty**. Yes, Mr. Chairman. To answer your question, no, I would hope that it would not be necessary to have that in the legislation. But we have had problems in the past getting the other agencies to give us an answer. And if this committee feels it is desirable, I do not believe that we would object to the setting of a time limit.

Senator **Warner**. You mention your final rulemaking of April 20, 1983, which removed burdensome and counterproduction regulatory requirements. Would you summarize what areas this rulemaking covered and would you submit for the record your April 20 rulemaking motion?

Mr. **Petty**. We were anticipating that question, Mr. Chairman. I had some notes prepared for me. The recent rule changes that were published in the Federal Register on April 20 eliminate the redundant requirement for prelease plans of exploration. They would allow for joint bonding of oil, gas, and geothermal operations. They also provide for the licensing of nonelectrical projects.

A provision granting the right to nonelectrical uses has been in the lease for quite some time, but we never had the rules to implement that part of the lease. It gives an alternative to performing actual diligent, exploration that of paying an additional rent of $3 an acre per year. The new rules also eliminate the old escalating rental requirements which were resulting in a lot of paper work and no revenues.

Those are the basic highlights, Mr. Chairman.

Senator **Warner**. In the past the department has required that lease options be exercised within days of lease offering. Recent directives have extended this time period for up to a year, which has allowed companies to control land in excess of statutory maximums. Does your April 20 rulemaking address this lease option exercise conflict with the statute?

Mr. **Duscher**. Mr. Chairman, they do not exercise control over this acreage. We have recent examples of where a KGRA has been expanded. As a result the applicant is no longer entitled to a noncompetitive lease. There are a number of things that could happen, but the applicants do not control those leases and in our notifications to applicants, we inform them that they have no rights and that if they do not come forward and accept the lease they may have their applications rejected.

Senator **Warner**. Has there been any bonus bids offered on a nonelectrical geothermal prospect?

Mr. **Petty**. I am aware of none. I do not know that we have ever put up one.

Mr. **Warner**. What is your Department's position on the 10-percent set-aside?

Mr. **Petty**. Mr. Chairman, as I have testified earlier, we do have some problems with the set-aside.

Senator **Warner**. That was not in your written statement though, was it?

Mr. **Petty**. Yes, it was. It is in the summary that I also gave.

Senator **Warner**. Could you point out the page?

Mr. **Petty**. On page 5, in the last paragraph, and on page 6, the first paragraph at the top, Mr. Chairman, we discussed the set-aside.

Senator **Warner**. Once again, clearly restate what the Department's recommendation is.

Mr. **Petty**. Our recommendation, Mr. Chairman, is that we not have a set-aside for public bodies. The reason is that we really have not had that much interest from public bodies.

Senator **Warner**. What is the Department's position on the noncash-bonus bidding allowed in both bills?

Mr. **Petty**. We would prefer to see that not in the legislation, Mr. Chairman. We have experimented with those bidding systems on the Outer Continental Shelf and we think it is a little late in the geothermal program to attempt experimental bidding with only about 600,000 acres left to be put up competitively. We still believe that the cash bonus system provides the best method of getting fair market value for these resources.

Senator **Warner**. Do you expect the Federal Government to earn more from bonus bidding on KGRA areas, or from royalties, once leases are brought into production?

Mr. **Petty**. Mr. Chairman, that is a very speculative thing, but I would hope it would be on royalties because once developed we see geothermal being a continuing renewable resource to be used for many years to come.

Senator **Warner**. If lands are leased noncompetitively would the developer have more funds available for exploration and thus possibly developing more geothermal resources for the Nation?

Mr. **Petty**. Yes; he would have more funds, because it would not be on his bid upfront. However, noncompetitive would be in the more speculative areas and more risks would be involved and it would in all probability require a lot more money.

Senator **Warner**. Thank you very much, Mr. Petty.

We are going to take a witness out of order now to accommodate personal travel plans. We will hear from Mr. Paul Pritchard, president, National Parks & Conservation Association.

STATEMENT OF PAUL C. PRITCHARD, PRESIDENT, NATIONAL PARKS & CONSERVATION ASSOCIATION

Mr. **Pritchard**. Mr. Chairman, I am most grateful to you this morning for accommodating my schedule. I am here today to testify on behalf of the National Parks & Conservation Association on behalf of the Wilderness Society. May I begin by saying though I am very pleased with your comments and with the comments that you read of Senator Jackson. That is specifically what I will refer to in my testimony.

And if I may, I would like to submit my testimony in full for the record.

Senator **Warner**. It will be accepted.

Mr. **Pritchard**. Thank you, sir. I will highlight then the specific points which I hope will receive special attention by the committee.

Senator **Warner**. That is done as you require.

Mr. **Pritchard**. Thank you, sir. We are particularly concerned and appreciate this opportunity to testify on both S. 558 and S. 883. In particular, our conclusion is to endorse the intent of S. 558, the amendments to the Geothermal Steam Act of 1970.

We find S. 883 limits itself to narrowly serve, we believe, to the specific resources and I would try to identify some specific provisions which are ignored in the S. 883 version. One that is not in my testimony, which I would like to note that we have just recently identified, is that in section 11 of that bill there is the identification that there are known two KGRA's in the Yellowstone area.

However, only the island, not Yellowstone, KGRA is specifically protected or at least identified and listed under section 11 and we are sure that is an oversight as such, but we want to at least bring your attention to our concern for that. Sir, in the world today there are only 10 major areas that have been known to have massive geothermal activity. Of those 10, 7 have been partially or fully destroyed, leaving only 3 of major significance.

We believe that the resources in the United States today in the three that are specifically identified of particular concern today Yellowstone, Lassen, and Hawaii Volcanoes are all three severely threatened today also and your concern and Senator Jackson's is one we feel is well founded.

All of the park units though, and there are some 21 listed on the final page of my testimony, we believe deserve equal protection under the law, because they all deserve or receive various levels of exposure. We would hope that in the bill itself that all 21 areas that are listed in the testimony could be fully identified, and listed, and protected equally.

We also feel that the term that must be expressed in the leasing concept is a term that the lease will have no significant adverse effect. We believe that these resources, Yellowstone, Lassen, and Hawaii Volcanoes, are so delicate that without clear scientific documentation and support, they will in fact be lost as have been the other 7 of the 10 known areas.

We, of course, feel that there are strong provisions under each of the bills. On page 6, I have identified those provisions under S. 558 which we think are particularly important. They are the requirement that the Secretary of the Interior publish a list of nationally significant thermal features within national parks and monuments and, again, we identify all 21, if we might;

Second, a description of geographical zones outside of national park boundaries where such development may affect the nationally significant features.

Third, when the Secretary may issue leases within the geological zones;

Fourth, the right of the Secretary to deny these leases for exploration or development on non-Federal lands within parks or geographic zones if a foreseeable significant adverse effect on a nationally significant geothermal future is indicated.

And, here again, we must realize that today we are still dealing with some 4, over 4 million acres of private inholdings within national park units and so this is in fact a very significant concern.

Fifth, the requirement of a study to determine any geothermal connection between Island Park and Yellowstone thermal resources we believe is very important and has not been fully completed or addressed. And,

Sixth, we feel the criteria for the issuance of leases in the Island Park area that unfortunately these amendments fall short of providing strict enough control criteria to assure the protection of all thermal features in the national park area.

Moving on, sir, of utmost concern is the lack of insistence that no lease application be considered or processed until there is in fact indisputable evidence in these park areas, which would show that they will not be adversely affected.

There are several provisions which we would ask be addressed in both of the legislation and particularly which we feel that neither appropriately addresses. On page 8, I have tried to list those. I will briefly summarize those if I might. First, the scope of the application is the new section 15 which should be broadened to nationally significant thermal features of any unit that I have mentioned before in identifying those 21 areas identified on the last page of my testimony.

Second, we believe the amendment should contain a provision explicitly prohibiting the Secretary from issuing any geothermal lease until the provisions of the proposed section 15(f)(1) have been complied with.

Third, the operative clause of the proposed section 15(f)(2) of S. 558, that clause is "will not have a foreseeably significant adverse effect," should be strengthened. We would suggest substitution of the phrase "will not degrade, diminish, or otherwise adversely affect any significant geothermal resource."

Fourth, we believe in submitting a report to Congress of significant thermal features and geographic zones surrounding parks as proposed in S. 558, the bill should be amended to provide a 90-day legislative review period for the Congress before the Secretary is permitted to issue any lease. Further, we feel the section should be amended to explicitly require Federal Register notice and public comment.

Fifth, although a technical amendment requirement, we would recommend that the bill be amended to include a requirement that for any leased area within the designated geographic zone around a park unit, that all spent fluids be reinjected into each geothermal well, as was suggested by the representatives of the Bureau of Land Management. This is the universally appropriate procedure and should be required in law. And, finally,

Sixth, we believe S. 558 should be amended to include a provision requiring continuous monitoring and periodic reporting to Congress of geothermal leasing and development activity in any of the designated geographic zones.

Mr. Chairman, we are concerned, not only with Yellowstone, Lassen, and Hawaii Volcanoes, but with all 21 areas. We believe that all should be treated evenly, and equally, and in law and that this provides that opportunity to provide that system of protection for needed geothermal resources that may be developed.

We hope, at least, that these areas merit more than an educated guess or the level of knowledge that we have today and that in fact they require additional study and evaluation. Thank you, sir for the opportunity to testify before you and present our testimony.

[The prepared statement of Mr. Pritchard follows:]

NPCA

STATEMENT OF PAUL C. PRITCHARD
PRESIDENT
NATIONAL PARKS & CONSERVATION ASSOCIATION

Before the
SUBCOMMITTEE ON ENERGY AND MINERAL RESOURCES
U.S. SENATE

on S.558 and S.883

May 2, 1983

Mr. Chairman, and Members of the Subcommittee, my name is Paul C. Pritchard, President of the National Parks & Conservation Association (NPCA), which, for over sixty years, has functioned as an independent conservation group dedicated to representing all Americans who advocate the protection and preservation of this country's magnificent national parks. We appreciate the opportunity to testify on bills S.558 and S.883, amendments to the Geothermal Steam Act of 1970. I have also been asked to testify on behalf of The Wilderness Society, which supports the positions taken in my statement on the proposed amendments to the Geothermal Steam Act of 1970.

In terms of protection of natural thermal resources within parks, NPCA endorses the intent of S.558 which takes a more comprehensive approach to protecting these features in prescribed park system units, while S.883 too narrowly limits itself to the issue of protecting thermal features in Yellowstone National Park.

The history of thermal energy development in relation to protection of significant thermal resources, worldwide and in the U.S., has been haphazard, speculative, and most unfortunately, in many instances, resulted in irreversible and irrevocable

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loss of thermal resources. Of the ten major geyser areas in the world, only three have been left undisturbed, including Yellowstone National Park. The other seven have either been severely, adversely affected or completely destroyed. Twenty-one units of the national park system host significant geothermal features which contribute to their unique ecosystems and outstanding criteria for inclusion in the system. Our primary concern is in the protection of these rare and magnificent resources and in preserving the integrity of the national park system. All parks are afforded equal protection under the law, to the exclusion of no one unit. Therefore, we strongly urge that any amendments to the Geothermal Steam Act must include specific park protection language generic to any of the twenty-one national park system units where thermal features occur.

The most important determination to be made before the commencement of any geothermal development near any national park must be accurate and conclusive findings that no subterranean interconnections exist between the thermal features available for leasing and development outside park boundaries, and those within the parks. S.558 (Section 11) addresses this issue with the requirement that the Secretary of the Interior issue "leases within designated geographic zones only upon review of the best geological, hydrological and other relevant evidence reasonably obtainable and only upon his determination that such lease will not have a foreseeably significant adverse effect on nationally significant geothermal features. S.883 only addresses such needs in the Island Park Geothermal Area adjacent to Yellowstone National Park. In NPCA's judgement, the broader terms of S.558 are preferable by far.

The parks must have even greater assurances of protection from the possible subsequent conclusions of such studies, more than "reasonably obtainable" data may offer. National parks were not set aside for speculation and experimentation, nor were they set aside to become the focus of opposing factions of both scientific and lay communities who have yet to make accurate and nondebatable determinations as to the connections and extensions fo underground geothermal systems. There are no degrees of adverse effect, significant or otherwise which should be intentionally imposed on national parks. Such phraseology goes against the entire national park concept.

Many scientists maintain that there are definite and serious risks to park thermal resources if adjacent areas are developed. One U.S.G.S. sceintist has concluded, "that natural discharge of water and heat is increased two-to-ten times by most exploitation programs (and), in general, we cannot exploit the geothermal energy of an area and also preserve its geysers." A Park Service Environmental Compliance Chief has cautioned, "It is very difficult to detect cause and effect relationships" in geothermal changes. Any suggested monitoring procedures could then possibly be affected by lag times and the problems of determining relationships.

Those who would place their faith in "monitoring" and "mitigating" measures to preserve park thermal resources must be severely cautioned. Laws governing the protection of our national parks do not contemplate such analytical hindsight. The history of geothermal development in two areas in the West has proven how shortsighted and unforeseeable we can be. The Beowawe Geysers in Nevada (at one time second only to those of Yellowstone in North America) stopped flowing by 1961 after centuries of activity because wells were drilled nearby in the 1940s and 1950s and allowed to discharge. Steamboat Springs, Nevada has also suffered due to geothermal activity during the 1950s and 1960s.

The three national park system units which would be most immediately threatened by geothermal exploration and development are: Yellowstone National Park, Lassen Volcanic National Park, and Hawaii Volcanoes National Park. The Island Park Geothermal

Area, adjacent to Yellowstone awaits action on 200 lease applications. The Island Park's eastern boundary is adjacent to Yellowstone and is thirteen miles from Old Faithful Geyser. Two completed studies have not ruled out a potential structural link between the Yellowstone-Island Park Calderas; have shown no evidence of structural barriers to fluid migration between the calderas; and have recommended the need for great caution with the development of the Island Park Area.

In addition to the thermal features in the Park, Yellowstone's other features would also be subject to adverse affects of geothermal development. In earlier testimony, Interior Department officials have expressed their concern as a result of proposed goethermal development, for threatened and endangered species including the grizzly bear, bald eagle, peregrine falcon, and gray wolf as well as specialized aquatic wildlife who depend on the delicate balance of nutrients provided in the hot springs.

The impacts of geothermal exploration and development in the Island Park calderas on the Yellowstone ecosystem, as listed in the Draft Environmental Impact Statement (DEIS), include permanent and temporary intrusions on the quiet and solitude of the region, air quality degradation and unpleasant odors, reduction of wilderness visual quality, and possible alteration of geothermal resources. There are also the problems of increased fire risk, effects of seismic activity, acid rain and ozone air pollution and thermal pollution.

Direct damage to the Island Park Area must not be excused from consideration either. Our concern extends to the Island Park area because of the range of the threatened grizzly bear from the park into that area. In 1979 EPA stated, "The development could cause significant environmental degradation to a largely pristine area adjacent to a national park... there appears to be potential for contamination of surface water important as sources of drinking water." Island Park habitats would suffer from ORV use in areas where now there are no roads or trails and from explosives used in seismic mapping. Exploration and development of geothermal resources would require the clearing of 1.5-2.0 acres of land for each generaging plant and the cutting of transportation pipelines and corridors through the forest which in turn could cause negative impacts on watersheds. Additionally, soil erosion and compaction, changes in vegetation because of heat loss, sewage runoff, introduction or exotic species, lowering of water tables, and mixing of aquifers present serious threats to the existing ecosystems.

In addition to the geothermal activity in Island Park, drilling for geothermal energy has already occurred North of the park in the vicinity of Gardner, not far from the also famous Mammoth Hot Springs features of Yellowstone. Commercial geothermal activity in this area is also of grave concern.

The thermal features of Lassen Volcanic National Park in California could be seriously jeopardized as well including; Terminal Geyser, Boiling Spring Lake, Devils Kitchen and Bumpass Hell. In 1979 Philip's Petroleum began drilling and development on a private inholding within the boundaries of Lassen. Although a 1982 appeal has stayed all geothermal leasing in Lassen National Forest due in part to the serious deficiencies in the Environmental Assessment (EA), including the problem of not addressing the concern that a no-lease buffer zone should surround Lassen National Park, strict legislation must protect this park's thermal resources. To suggest that there is a measurable buffer area surrounding a park's thermal features which will ensure the protection without the benefit of accurate data identifying underground connections of the calderas in any of the park areas with those outside park boundaries would be ill-advised. Park boundaries and imposed buffer areas are artificial and cannot accurately reflect the nature of the resources in need of protection until the proper scientific evaluations are made.

At Hawaii Volcanoes National Park the proposed development of a 2[illegible] megawatt geothermal energy complex with 50% of its wells to be located within 1,000 feet of the boundary of the park has resulted in a lawsuit filed by the Volcano Community Association and individual residents to halt the issuing of a special permit in the conservation district surrounding the park. The suit contends that inadequate environmental impact statements were prepared and do not sufficiently address the probable impact on the resources of the park. Hawaii Volcanoes is one of the park system's outstanding resources. It has been declared an international Biosphere Reserve hosting active volcanism, rare species of vegetation which provide habitat for a unique animal population, and a visual experience unequalled by any park unit in the system. The area proposed for development (Kahauale'a) is one of the remaining pristine wilderness rainforests in Hawaii, and should be given careful consideration for inclusion in the park long before any geothermal development is contemplated. There are alternative sites for such proposals.

Although we oppose the limited protection for only one park contained in S.383, and although we support the broader application of S.558 to protection of national park and monument resources, there remain certain inadequacies in both bills. While S.558 addresses such important issues as: (1) the requirement that the Secretary of the Interior publish a list of nationally significant thermal features within national parks and monuments; (2) a description of geographic zones outside national park boundaries where such development may affect the nationally significant features; (3) when the Secretary may issue leases within these geographic zones; (4) the right of the Secretary to deny leases for exploration or development on non-federal lands within parks or geographic zones if a "foreseeable significant adverse effect" on a nationally significant goethermal feature is indicated; (5) the requirement of a study to determine any geothermal connection between Island Park and Yellowstone thermal resources; and (6) criteria for the issuance of leases in the Island Park Area, these amendments fall short of providing strict enough control criteria to assure the protection of all thermal features in the national park system.

Of utmost concern is the lack of insistence that no lease application be considered and processed until indisputable evidence is amassed to indicate that thermal development activity will in no way affect those features within adjacent national parks. Until this is accomplished the terms "foreseeably significant adverse effects" based on the "best reasonably obtainable" evidence are meaningless.

NPCA is in accord with S.558's mandate that the Secretary identify significant thermal features within national parks and monuments and would further suggest that the bill include language to establish criteria for the determination of a significant thermal feature (but not at the expense of thermal features not awarded such recognition, as all parks are afforded equal protection under the law) including:

a. size, uniqueness and other characteristics of such features.
b. the scientific or geologic significance of such feature.
c. the extent to which such feature remains in an undisturbed natural condition.
d. the relationship between such features and other features, resources, and values of a park system unit, including scenic, scientific, wildlife and wilderness values.

Before the Secretary publishes the list of significant thermal features there should be included in the legislation a provision which requires him to receive and consider public comments and suggestions as to which thermal features should be included on such list. Citizens should be allowed to petition for inclusion of any areas with documentable and supportable justification set forth in the criteria for determination of a significant thermal feature.

As is consistent with the Secretary's duty to protect the park's thermal features, in addition to a strict monitoring system for possible adverse effects to park unit thermal features, the legislation should include a provision giving the Secretary immediate authority to halt such activity if indicators present evidence of negative impact on park resources.

There are several specific amendments to S.558 which should be adopted to improve its protection for park thermal features.

First, the scope of application fo the new Section 15 should be broadened to nationally significant thermal features of any unit of the national park system, not just those distinguished by the name "park" or "monument."

For example, the Alaska National Lands Conservation Act (ANILCA) makes it explicit that in Alaska, there is no difference between national park units and national preserve units, except for sport hunting which is permitted in preserves. There are at least two national preserves - Bering Land Bridge and Aniakchak, with a history of geothermal activity and extant thermal features - surely these should be included in the scope of park protection in amendments to the Geothermal Steam Act.

Second, the amendments should contain a provision explicitly prohibiting the Secretary from issuing any geothermal leases until the provisions of proposed section 15(f)(1) have been complied with; that is, until the initial list of nationally significant thermal features in units of the national park system have been identified.

Third, the operative clause of proposed section 15(f)(2) of S.558 (p.9, line 24) "will not have a foreseeably significant adverse effect" should be strengthened. We would suggest substitution of the phrase "will not degrade, diminish, or otherwise adversely affect any significant geothermal resource..."

Fourth, in submitting the report to Congress of significant thermal features and geographic zones surrounding parks as proposed in S.558, Sec. 15(f)(1) the bill should be amended to provide a 90 legislative day review period for the Congress, before the Secretary is permitted to issue any lease. Furthermore, Sec. 15(f)(2) should be amended to explicitly require Federal Register notice and public comment opportunity each time the Secretary proposes to issue a lease within one of the designated geographic zones, and each time he proposes to modify one of the zones based on new data.

Fifth, and although a technical requirement, we recommend that the bill be amended to include a requirement that, for any leased area within the designated geographic zone around a park unit, that all spent fluids be reinjected into each geothermal well. Such reinjection woudl be universally appropriate to help assure maintenance of the necessary hydrostatic pressure in the subterranean geothermal system, which, if a connection with park geothermal features exists, would lessen the chance of damage to such features.

Sixth, S.558 should be amended to include a provision requiring continuous monitoring, and periodic reporting to Congress, of geothermal leasing and development activity in any of the designated geographic zones.

If the broader text of S.558 is adopted in part or in full, we would also suggest a technical amendment in Section 11, p.12, line 3, by striking the word "completion" and substituting the word "submission."

Preservation of the geothermal features of Yellowstone, Hawaii Volcanoes, Lassen Volcanic National Parks and other national park system units shown on the attached list merits more than an educated guess for a few megawatts of electricity.

We appreciate the opportunity to testify before the Subcommittee and would be happy to answer any questions and provide additional information.

NATIONAL PARK SYSTEM UNITS WITH KNOWN THERMAL FEATURES OF NATIONAL SIGNIFICANCE

Park Unit	State
Aniakchak National Monument & Preserve	AK
Bering Land Bridge National Preserve	AK
Denali National Park & Preserve	AK
Gates of the Arctic National Park	AK
Glacier Bay National Park	AK
Katmai National Park	AK
Lake Clark National Park & Preserve	AK
Wrangell-St. Elias Nat'l Park & Preserve	AK
Yukon Charley Rivers National Preserve	AK
Hot Springs National Park	AR
Lassen Volcanic National Park	CA
Sequoia National Park	CA
Hawaii Volcanoes National Park	HI
Haleakala National Park	HI
Yellowstone National Park	ID, MT, WY
Lake Mead National Recreation Area	NV
Big Bend National Park	TX
Mt. Rainier National Park	WA
Olympic National Park	WA
Grant Teton National Park	WY
John D. Rockefeller, Jr. Mem. Highway	WY

Senator **Warner**. Thank you very much for joining us. I would like to get a better understanding of some of the terminology you used. On page 7 you say: "Of utmost concern is the lack of insistence that no lease application be considered and processed until indisputable evidence is amassed," and so forth. Is that like you say in the law beyond a reasonable doubt? What is that?

Mr. **Pritchard**. I think the issue before us today, sir, is that there is insufficient knowledge of the impact that might occur in areas such as Yellowstone, that we are, in fact, leasing, and as was suggested before, it oftentimes is the rate of leasing. Each of these areas is completely different. There is no set limit, mileage as you asked before, and if I might respond to that in the same context, that could be used as a criteria.

It really depends on the subsurface thermal connections, geothermal connections. We are concerned that there is insufficient documentation at least for these important areas, the 21 national parks and in particular Yellowstone, where there is tremendously an accelerating rate of leasing activity at this point.

Senator **Warner**. Theoretically, do you believe that development is compatible with these things in a reasonably economic way?

Mr. **Pritchard**. I believe that we have good science, good scientists. They are highly competent and the different agencies that we deal with, I have dealt with personally as an administrator in the Department of the Interior, and I respect their judgment. I think that oftentimes we have to use the best available technology for determining the impact.

I would say in these areas they should be the last developed and any slightest possible impact should require us to pause and wait until we have developed other resources before we actually feel or need to develop the resources that might impact the national park resources.

Senator **Warner**. When you say develop other resources, do you mean coal and synfuels? What do you mean by that?

Mr. **Pritchard**. I would certainly agree with other energy resources, but, sir, I was also referring to geothermal areas where we know there is no direct relationship to the eight units in the national park system, those 21 units.

Senator **Warner**. I certainly share with you the objective of preserving these magnificent gifts by nature to us. I am just concerned with the standards under which this development would take place. It is so rigid that we might be totally discouraged, but in any case, maybe we ought to exhaust other energy sources before we go to them.

Mr. **Pritchard**. Other geothermal also, sir, I would encourage that—but we have included in the testimony a process for which we believe at least the Senate and the House will have sufficient time to review public comments and will have other pieces of information before these areas directly impacted or these resources that would have direct impact on national parks should be developed.

So our testimony is an effort to try to reconcile the difference between our personal objective that the parks deserve as you have shown in your own efforts, the utmost protection, and we believe the process of public review and the openness that should occur, the need to look at each resource individually rather than setting any artificial boundary area around a geothermal area—all of those must be considered as we address these resources.

Unfortunately, sir, it seems that oftentimes the national parks in any area are the first to be developed or the resources around them, we find, rather than in other areas that could be developed first, and we are concerned about that. We understand the impression of many that it is best to get in and get out of those locations first, but it does give us concern that we do not have the appropriate knowledge or scientific basis to judge the impact of these activities.

The testimony that I submitted also details other impacts on endangered wildlife and I know you and others have expressed concern about this. The Yellowstone, clearly man's intrusion in that area, and it is not just limited to the national park, will have a continuing adverse impact on the plight of the endangered species and wildlife of Yellowstone, including the bear.

Senator WARNER. What would be the invention of a buffer zone, do you think, that would be suitable?

Mr. PRITCHARD. I assume, sir, you are referring to Yellowstone. Is that correct? Well, clearly, the Island and Yellowstone are areas of importance, but there is also a larger area which no one really knows today and I wish I had the knowledge to give you, but we would move into the Forest Service areas surrounding the national park units.

This is something that requires a great deal of study, though, and no one knows for sure, I think, how large an area we should be protecting.

Senator WARNER. You have a far superior knowledge to mine and we have a lot of work to do here. Thank you very much.

Mr. PRITCHARD. Thank you, sir. Once again, I want to thank you for your efforts.

Senator WARNER. We will now hear from Dr. Hilmon, Associate Deputy Chief, Forest Service.

STATEMENT OF DR. J. B. HILMON, ASSOCIATE DEPUTY CHIEF, FOREST SERVICE, DEPARTMENT OF AGRICULTURE

Dr. HILMON. Thank you, Mr. Chairman. I have a brief statement, which I will read into the record at this time. I appreciate the opportunity to be here today to offer the Department of Agriculture's views on these two bills. They would make numerous technical and substantive revisions and additions to the Geothermal Steam Act of 1970.

The Forest Service administers 191 million acres of national forest lands. These lands include many of the most promising geothermal areas. Section 15(b) of the Geothermal Act of 1970 provides that national forest system lands may be leased by the Secretary of the Interior, subject to the consent of the Secretary of Agriculture and subject to special terms or conditions that he may prescribe.

The Forest Service has an active program for determining if specific lands should be leased and if special conditions are necessary to protect National Forest purposes and uses. Admittedly, this task is often difficult and time-consuming because of the commonly perceived conflict between geothermal development and some surface resources.

Some of the most promising geothermal areas are on national forest system lands, near national parks or are areas of the national forests, highly valued for their scenic, wildlife, recreational, and water resources. These bills specifically address areas where the consideration of geothermal leasing has been highly publicized and controversial.

The majority of the provisions of the bills deal with technical matters on which we defer to the Department of the Interior for comment. We do wish to comment, however, on several provisions of importance to the management of the national forest lands. These comments apply to both bills.

As I mentioned earlier, section 15(b) of the Geothermal Steam Act provides that the Secretary of Agriculture must consent before national forest lands can be leased and that he may require special terms and conditions to insure adequate protection of the lands for national forest purposes.

Section 10 of the proposed amendment would remove this requirement and provide for consultation between the Secretary of the Interior and other surface-managing agencies before lands administered by the other agencies could be leased, except that lands acquired by another agency could be leased only with the agency's consent.

This proposed change is unsatisfactory to USDA and, I was pleased to see this morning, also to the Department of the Interior. Geothermal operations could significantly affect other important uses and resources for which the Department of Agriculture is responsible. This could be true for lands reserved from the public domain as well as for acquired lands.

I think I will skip then to another point, some other remarks on the pertinence of that are in my testimony, but I will skip on to other more important points. We are very much aware of the need to insure that important thermal features of the national parks are protected. While we believe such protection can be provided under existing regulatory procedures, we defer to the Department of the Interior with respect to analysis of specific proposals provided in section 11.

As presently written section 12(c), which would allow the Secretary of the Interior to issue free permits for noncommercial uses other than electricity generation, does not apply to national forest lands. We support the exclusion of national forest system lands from this provision. We believe there should be reasonable user fees for the use of national forest resources.

Section 14 provides that geothermal resources are covered by section 4(d)(3) of the Wilderness Act of 1964. This would essentially provide that lands in the wilderness system could be leased under terms of the Geothermal Steam Act through December 31, 1983, after which the lands would be withdrawn from geothermal leasing. We have no opposition to this proposal, but since we are prevented from processing wilderness lease applications by section 308 of the 1983 Appropriations Act, this may be a moot issue.

This concludes my prepared testimony. We have a supplement which includes a couple of editorial-type comments. Thank you very much.

[The prepared statement of Dr. Hilmon follows:]

STATEMENT OF
DR. J. B. HILMON, ASSOCIATE DEPUTY CHIEF
FOREST SERVICE,
UNITED STATES DEPARTMENT OF AGRICULTURE

Before the
Subcommittee on Energy and Mineral Resources
Committee on Energy and Natural Resources

Concerning S. 558 and S. 883

Bills to Amend the Geothermal Steam Act of 1970

May 2, 1983

MR. CHAIRMAN AND MEMBERS OF THE SUBCOMMITTEE:

I appreciate the opportunity to be here today to offer the Department of Agriculture's (USDA) views on S. 558 and S. 883. These bills would make numerous technical and substantive revisions and additions to the Geothermal Steam Act of 1970.

The Forest Service administers about 191 million acres of National Forest System (NFS) lands. These lands include many of the most promising geothermal areas. Section 15(b) of the Geothermal Steam Act of 1970 provides that NFS lands may be leased by the Secretary of the Interior, subject to the consent of the Secretary of Agriculture and subject to special terms or conditions that he may prescribe. The Forest Service has an active program for determining if specific lands should be leased and if special conditions are necessary to protect National Forest purposes and uses. Admittedly, this task is often difficult and time-consuming because of the commonly perceived conflict between geothermal development and some surface resources. Some of the most promising geothermal areas on NFS lands are near National Parks or are areas of the National Forests highly valued for their scenic, wildlife, recreational, and water resources. These bills specifically address areas where the consideration of geothermal leasing has been highly publicized and very controversial.

Mr. Chairman, the majority of the provisions of the bills deal with technical matters on which we defer to the Department of the Interior for comment. We do, however, wish to comment on several provisions of importance to the management of the NFS lands. The following comments apply to both bills.

Section 15(b) of the Geothermal Steam Act provides that the Secretary of Agriculture must consent before NFS lands can be leased, and that he may require special terms and conditions to ensure adequate protection of the lands for National Forest purposes. Section 10 of the proposed amendment would remove this requirement and provide only for consultation between the Secretary of the Interior and other surface managing agencies before lands administered by the other agencies could be leased--except that lands acquired by another agency could be leased only with that agency's consent. This proposed change is unsatisfactory to USDA. Geothermal operations could significantly affect other important uses and resources for which the USDA and other agencies are responsible. This could be true for lands reserved from the public domain as well as for acquired lands. The proposed amendment seems to be modeled after the terms of the 1920 Leasing Act and the 1947 Leasing Act for Acquired Lands relative to oil and gas. Geothermal leasing has the potential for greater disruption of multiple-use management of the lands than oil and gas leasing because of the provision for on-site geothermal use or conversion. The terms of the 1920, 1947, and 1970 Acts show an evolution of the role of the surface managing agency. We believe it would be inappropriate to return to concepts of the 1920 Act, which has been augmented by interagency agreements to solve jurisdictional problems.

We are very much aware of the need to ensure that important thermal features of the National Parks are protected. While we believe such protection can be provided under existing regulatory procedures, we defer to the Department of the Interior in regard to analysis of the specific proposals provided in Section 11.

As presently written, Section 12(c), which would allow the Secretary of the Interior to issue free permits for noncommercial uses other than electricity generation, does not apply to NFS lands. We support the exclusion of NFS lands from this provision. We believe that there should be reasonable user fees for the use of National Forest Resources.

Section 14 provides that geothermal resources are covered by Section 4(d)(3) of the Wilderness Act of 1964. This would essentially provide that lands in the Wilderness System could be leased under terms of the Geothermal Steam Act through December 31, 1983, after which the lands would be withdrawn from geothermal leasing. We have no opposition to this proposal, but since we are prevented from processing wilderness lease applications by Section 308 of the 1983 Appropriations Act, this may be a moot issue.

This concludes my prepared testimony. We have provided as a part of this statement a written supplement containing technical and editorial suggestions. I will be glad to respond to any questions the Committee may have.

SUPPLEMENTAL STATEMENT
TO
S. 558 and S. 883

Section 6, both bills: The apparent intent of this section could be clarified by removing the words "as utilized" in line 15, page 4; and substituting "based on the type of use."

Section 8, both bills: We suggest that subsection (c) be reworded to read "Any lease which contains a well. . . ." to prevent a single producing well from exempting a block of leases from acreage limitations. There should be new language to repeal the last sentence of Section 18 of the act because that provision is moved to Section 7(c) by this bill.

Senator **Warner**. Thank you very much. There will be included in the record any other questions we have, which will be submitted to you in writing.

We will now hear from Dr. Bloomquist, geothermal specialist, Washington State Energy Office.

STATEMENT OF DR. R. GORDON BLOOMQUIST, GEOTHERMAL SPECIALIST, WASHINGTON STATE ENERGY OFFICE, OLYMPIA, WASH.

Dr. **Bloomquist**. Mr. Chairman, I am very pleased to be here today and have this opportunity to testify in regard to provisions of Senate bills 558 and 883. The need to pass legislation to reduce or eliminate legal and institutional barriers to geothermal exploration and development is greater today than it was when such legislation was introduced 4 years ago.

Leasing is still progressing at an unbearably slow rate. Lands are tied up through KGRA designations where there is no interest or geological indication of electrical potential. Companies are unable to assemble exploration teams and aggressively assess and develop geothermal resources due to severe acreage limitations.

Utilities in many areas are unable to lease and develop prospective lands due to utility commission prohibitions against expending large sums of risk capital or bidding in a so-called fish bowl environment. And, finally, direct use geothermal development has been almost nonexistent on Federal lands due to unreasonably high royalties assessed.

Both Senate bill 558 and Senate bill 883 address a majority of these issues, although in somewhat different manners. Mr. Chairman, I would like to depart somewhat from my written testimony which you have before you today and direct my testimony at three particular subjects.

First, provisions affecting leasing of geothermal lands for electrical generation; second, provisions related to direct geothermal utilization; and, third, provisions for protecting the nationally significant thermal manifestations of our national park system.

The lack of access to Federal lands remains the most serious problem facing geothermal development in the State of Washington and throughout much of the West. Of 447 lease applications filed in the State of Washington since January 1, 1974, only 32 have been issued to date.

In Oregon, 377 leases have been issued out of 1,571 lease applications. The provisions of both S. 558 and S. 883 which provide for consolidation of the leasing of all except acquired lands under the Secretary of the Interior would be a major step toward streamlining leasing and providing better access to Federal lands. The Secretary of the Interior has already gone as far as he can through interdepartmental reorganizations. With the passage of this legislation, all leasing decisions as well as regulation of exploration and development activities will be under the Bureau of Land Management.

This should result in significant time reductions in the processing of leases and permits as well as assuring that the expertise and manpower is available to administer all the geothermal leases on

Federal lands. As serious as the lack of access to Federal lands has been, because of delays in leasing, the 20,480-acre limitation per State has had a more devastating effect upon the development of geothermal industry.

In Oregon, where leasing has progressed at a somewhat better rate than Washington, 130 leases have been relinquished over the past few years. Many of these leases were relinquished because of the acreage limitation. As new prospects were identified, often through the work of Federal agencies, leases though not thoroughly evaluated, had to be given up so that new prospects could be secured.

Probably the most serious result of the acreage limitation has been the inability of the industry to establish viable geothermal exploration divisions. There has simply been too little land available to warrant the expenditures in either dollars or manpower, which would be required to truly establish the geothermal industry as a viable, additional energy source.

Although we feel that an increase in the acreage limitation of 51,200 acres is a necessity, we are reluctant to support an additional increase to 115,200 acres in 1990 unless more stringent diligence requirements than those proposed in Senate bill 883 are adopted. Many substantial lease blocks are being held strictly for speculation, with the hopes that a nearby discovery will increase the value of the lease and result in a buy-out by one of the major companies.

The adoption of more stringent diligence requirements would alleviate this problem. We would like to suggest that 4 years would be adequate for exploration up to the point of asking for a drilling permit and within 2 years of receipt of the drilling permit, the drilling should commence.

We are strongly in favor of the provisions of both S. 558 and S. 883 which would substitute a 20-year readjustment of lease terms and conditions for the present 10-year readjustment. This is an essential change, especially since utilities must make power requirement projections well into the future. If this provision is finally adopted, it should not be modified to provide for 20 years' readjustment in rentals and royalties. Such a 20-year readjustment in royalties and rentals is at present being considered by the House.

If adopted it would make economic determinations of utilities impossible and be a severe blow to geothermal development.

Finally, in regard to leasing problems, I would like to address noncash bonus bidding and the 10-percent set-aside, both which have been extremely controversial with industry. I believe that originally both of these provisions were introduced to make it possible for utilities and others who are unable to offer cash bonus bids to become more actively involved in geothermal exploration and development.

I believe that this goal could be achieved equally as well if 10 percent of each KGRA sale were offered on an other than cash bonus bid basis upon request by a public body or rural electric cooperative or other nonprofit corporation. I believe that this would result in a fair and equitable system which would be easily established and administered by the Secretary.

The idea of a cash bonus bid is almost like the Government betting that you will be unsuccessful. Bidding royalties is a system which would allow these companies to become involved and the Federal Government would receive more money in return on royalties.

Mr. Chairman, very little attention has been given to nonelectric geothermal resources by a majority of those who have testified on the need to enact this legislation. This is quite understandable in terms of the economic value of the electrical and geothermal resources and the much smaller scale and lower returns on investment associated with direct use development.

However, most estimates of the national geothermal potential agree that direct use resources outnumber electric quality resources by a minimum of ten to one. The development of nonelectric resources on Federal lands, however, has been all but nonexistent, mainly due to unreasonably high royalties which would be assessed on such use.

In fact, the present 10 to 15 percent royalty has been such a deterrent that according to the U.S. Geological Survey, one nonrecord project from a Federal lease occurred in 1982 and then the amount of the resource used was so small that no royalty was actually collected.

A reduction in the royalty to 5 to 10 percent will be very beneficial. However, the adoption of a variable royalty based on energy extraction such as is being considered by the State of Washington, could result in even wider use of low temperature resources on Federal lands. The system under consideration rewards full utilization of the heat content by assessing increasingly lower royalties with greater energy extraction.

The system is unique in that it not only encourages more full utilization of the resource but also would result in increased revenues to the Federal Government. The other provision of this legislation which deserves consideration in terms of nonelectric utilization deals with the deferral of royalty payments for nonelectric geothermal developments or in municipal cooperatives and other political subdivisions. A deferral of such royalties, as I understand it, means that these royalties will occur and must eventually be paid, I presume with interest.

This will serve as a serious disincentive. Instead a system whereby the Secretary of the Interior could excuse such royalty payments for a period to be determined by him would serve the intent and purpose and encourage nonelectric utilization by political subdivisions.

Finally, Mr. Chairman, protection for the nationally significant thermal manifestations of our national park system is of utmost importance. Both S. 558 and S. 883 address this question in some detail S. 883, however, only provides protection of a portion of Yellowstone National Park and although I feel that the recommendations as made provide a high degree of protection to areas in Yellowstone, I feel that other thermal manifestations should also receive similar consideration.

For example, Long Mire Hot Springs was to a large extent responsible for the creation of Mount Rainier National Park. At present of the four primary tourist areas within Mount Rainier National Park, two of them are Long Mire Hot Springs and Honokosh Hot Springs. Neither of these spring systems is more than 1 mile from the park boundary and that could be severely affected by significant geothermal development near the park.

In a similar manner thermal manifestations in Lassen National Park are near the southern boundary of that park. A thorough evaluation of the possibility that development would interfere with these or other nationally significant resources should be conducted by the U.S. Geological Survey before leasing in these areas proceeds.

I would also like to make a point that both bills refer to a thermal geological connection as being the criteria for establishing the connection between Yellowstone and the *Island Park KGRA. I* believe that the terminology should have been a hydrological connection instead of a thermal geological connection.

I urge the committee to adopt such provisions and to pass this legislation at the earliest possible time. Thank you, Mr. Chairman. I would be pleased to answer any questions.

[The prepared statement of Dr. Bloomquist follows:]

STATEMENT OF DR. R. GORDON BLOOMQUIST, GEOTHERMAL SPECIALIST, WASHINGTON STATE ENERGY OFFICE

Mr. Chairman, Members of the Committee,

My name is Dr. R. Gordon Bloomquist. I am a geologist with the Washington State Energy Office, and I serve as Chairman of the Washington State Interagency Geothermal Development Council.

I am very pleased to have this opportunity to address the Committee regarding S 558 and S 883, the "Geothermal Steam Act Amendments of 1983."

The passage of legislation to amend the Geothermal Steam Act of 1970 at the earliest *possible time is essential to the development of the nation's* tremendous geothermal potential. Many of the provisions of the Geothermal Steam Act of 1970 have served to severely stifle the development of a viable geothermal industry. Provisions which have had the most serious effect include:

1. Classification of large areas with no electrical potential as KGRA's;
2. Creation of KGRA's on the basis of overlapping lease applications;
3. An inability to declassify areas where no intent in leasing exists;
4. An acreage limitation of 20,480 acres per state;
5. A ten-year readjustment period for lease terms;
6. A cash bonus bidding system which has severely restricted utility involvement; and
7. An unrealistically high royalty on non-electric projects.

The problems which have resulted from the above mentioned provisions of the Act have been multiplied by an almost complete lack of access to federally managed lands in much of the West.

In Washington State, 447 leases have been applied for since January 1, 1974; and as of April 1, 1983, only 32 leases had actually been granted. In Oregon, out of a total of 1,571 lease applications, only 377 had been granted as of April 1, 1983. Of the 377 leases granted in Oregon, 130 have been relinquished, many due to the 20,480 acreage limitation.

The increase in the acreage limitation to 51,200 acres, as recommended by both S 558 and S 883, is vital. The lease limitation of 20,480 acres per state has resulted in serious problems for many of the more aggressive energy development companies which have been prevented from mounting active exploration programs in more than one or two areas per state. This problem has served to severely restrict the growth of the geothermal industry. In Washington, many lease applicants will be at the 20,480 acre limitation as soon as leases are made available, and several others have applied for acreage in excess of the limit in anticipation of an increase to the more realistic figure of 51,200 acres. For example, Seattle City Light originally applied for nearly 100,000 acres, and, after two years of exploration at a cost of several hundred thousand dollars, is unable to determine at this time which 20,480 acres they should retain. The increase to 51,200 acres is vital if such organizations are to be able to conduct successful exploration programs.

An increase in the acreage limitation, however, will only serve its intended purpose if lease and permit applications receive timely processing by the responsible agencies, and adequate diligence requirements are adopted to encourage exploration and development and to prevent large areas from being tied up solely for speculation.

We are extremely supportive of the provisions of S 558 and S 883 to increase the acreage limitations at this time. We feel, however, that the provision to allow the Secretary to increase the acreage limitation to 115,200 in 1990 as found in S 883 is, at this time, unwarranted. This is especially true in light of the provision to exclude holdings shown to be capable of commercial production or operated under an approved operating, drilling, or development contract.

We are also convinced that an increase in the acreage limitation will not serve its intended purpose if adequate diligence requirements are not imposed upon industry to ensure that these areas are adequately explored. Diligence requirements such as those recommended in S 558 are highly desireable and quite realistic.

We strongly favor the provision of S 558 and S 883 which establish a bidding system for KGRA lands which is not based upon cash bonus bidding. This provision is extremely important because of the restrictions against bonus bidding by most utility commissions. We would, however, suggest that the Committee consider incorporating into this provision a system by which public bodies could nominate lands for consideration by the Secretary as those which would be offered on a non-cash bonus basis.

We strongly support means to protest the nationally significant features in our National Park System, and urge the Committee to adopt such measures to protect not only Yellowstone National Park, but Lassen and Mt. Rainier National Parks as well. Measures adopted by this Committee must, however, be flexible enough so as to neither hamstring the geothermal industry nor place undue burdens upon the Secretary of the Interior.

The state of Washington, along with most of the western states, is blessed with an abundance of low temperature geothermal resources; resources which can make substantial reductions in our need for fossil fuels. In fact, most experts estimate that the non-electric geothermal potential in the United States is a minimum of ten times the geothermal potential for electric generation.

The development of non-electric resources on federal lands, however, has been all but non-existent, mainly due to the high royalty which would be assessed on such use. In fact, the 10-15 percent royalty has been such a deterent that, according to a United States Geological Survey study, only one non-electric project utilized geothermal resources from a federal lease in 1982, and then the amount of resource used was so small that no royalty had actually been collected.

In 1979, Charles V. Higbee, of the Oregon Institute of Technology, testified to the Committee that in the case of the Klamath Falls, Oregon, district heating system, a 10 percent royalty on the energy used would amount to 55.5 percent of the total operating cost of the system for the first year. Fortunately, there were resources available on non-federal lands for this project. We support the reduction in royalty on direct use to 5-10 percent, but urge that no royalty be imposed on direct use projects until 1990 to allow this segment of the geothermal industry to become established.

We also strongly favor the issuance of free use permits for non-electric uses as proposed by both bills, but urge the Committee not to exclude the use of such permits for farms or small businesses. Legislation considered in previous sessions by this Committee would have authorized such use.

Mr. Chairman, we have not commented on all of the provisions of the bills, choosing instead to concentrate on those aspects which we feel would provide the greatest benefit to the development of the geothermal resources of Washington State. We applaud the Committee's efforts, and appreciate having been permitted to testify today. I'd be pleased to answer any questions or assist the committee in any way.

Senator **Warner**. What about the buffer zone issue, how far away do you think that should be?

Dr. **Bloomquist**. In answer to your earlier question about the interference of the development on thermal manifestations, I believe that the answer of 3 miles was the correct answer. I believe that any buffer zone that allowed for a distance of a minimum of 3 miles would be adequate in any situation. In the case of Yellowstone, I believe that most of the thermal manifestations are a minimum of 9 miles from the park boundary.

Senator **Warner**. We would like to submit some questions. I know Senator Jackson has some. Thank you very much.

Dr. **Bloomquist**. Thank you.

Senator **Warner**. Our next series of witnesses will constitute a panel and if they will now come forward. Thank you, gentlemen. We have with us Captain E. W. Cole, vice president, Union Oil Co.; Mr. Wright, chairman of Western Oil & Gas Association; Mr. Garland Robbins, manager of Geothermal-Sunedco; and Mr. Charles Condy, president, California Energy Co.

We will take our testimony in that order. Captain Cole.

STATEMENT OF CAPTAIN E. WILLIAM COLE, VICE PRESIDENT, WASHINGTON OFFICE, UNION OIL CO. OF CALIFORNIA

Captain **Cole**. Mr. Chairman, my name is William Cole. I am vice president of the Washington office of Union Oil. I have submitted my statement for the record and I would request permission just to summarize it here.

Union Oil is the world's largest producer of geothermal energy. We have been engaged in geothermal development and production since 1965. At the present time, we are producing steam, which generates about 1 million killowatts of electricity in California and about 550 killowatts of electricity in the Philippines.

Initially, we have entered into an agreement to develop geothermal resources in Japan and Indonesia and are engaged in active negotiations to develop geothermal resources in Turkey and Italy. With respect to Indonesia, it is interesting to note that although they have a plentiful resource of petroleum, the Government has chosen to develop geothermal energy for domestic consumption, thus allowing them to sell more petroleum overseas.

Geothermal projects are economically beneficial to our community. The geysers project in California, of which we are the operator, is a good example. It makes a sizable contribution to the Sonoma County economy, while at the same time demanding very little in the way of public service or expense.

Last year, for example, the project paid more than $10 million in property taxes to the county and school districts. Local purchases by the companies involved amounted to more than $35 million. Then annual payroll for 233 employees was about $8 million.

This resulted in a total economic contribution of $53 million. Assuming that each dollar will turn over at least 2½ times before leaving the community, which is a conservative estimate, the geysers project contributed $132 million annually to the community economy. In addition, royalties from the geysers amounted to $15 million—$6 million to private landowners and $9 million to State and Federal governments. These numbers will go even higher in 1983.

Turning now to the specific bills under consideration, with respect to any geothermal legislation, the most important provision to promote the development of geothermal energy in the United States is the absolute necessity to increase the acreage limitations. In truth, in my judgment this is the only provision in either bill that is absolutely essential at this time. Both S. 558 and S. 883 contain such a provision and we support it.

In fact, the existing acreage limitation in Federal law has been one of the factors most responsible for Union's expansion of foreign geothermal operations. Instead of development of U.S. resources, which would provide the United States with the benefit of additional energy and jobs, we have been forced overseas for lack of good U.S. process.

Another provision in both bills which we support is the definitional change for known geothermal resource areas, KGRA's. It makes good sense to base the KGRA decision on geologic evidence rather than economic speculation.

We support the provisions of both bills which increase from 10 to 20 years the interval between lease negotiations. This provision will provide greater access to the capital markets and greater stability in geothermal development.

Now, the provisions that we do not particular care for. Both S. 558 and S. 883 contain a noncash bonus bidding provision. This is particularly burdensome to geothermal leases. When one discovers an oil and gas well, he instantaneously has a valuable asset, which can be used to promote further capital and additional development and the returns are almost immediate.

In the geothermal area, it takes many years between the discovery of a well and the ability to realize income as a result of the discovery. Numerous wells, a proven resource and most importantly a sales contract for the utility may take 6 to 12 years to develop and are necessary before one can realize a return on an investment.

For this reason noncash bonus bidding encourages speculators rather than genuine developers. The experience in California where noncash bonus bidding is permitted on State lands has shown that bids in some instances of 95 percent of the royalty are made with results that nothing is accomplished in developing on the leases.

With respect to the national parks, we think that the existing environmental laws completely provide the necessary authority to protect parks and monuments. However, we recognize the sensitivy with respect to Old Faithful, Yellowstone National Park, and other national monuments. We support the park language in S. 883.

However, the provisions of S. 558 are too comprehensive and restrictive. The potential exists for unnecessary tying up large amounts of potentially valuable land.

The diligence provisions contained in S. 558 and S. 883 are more stringent than existing regulations and are, in our opinion, unnecessary. We support the present 10-year requirement and we believe that the unusually strict provisions of S. 558 for a 5-year period may cause premature drilling and unnecessarily increase the cost of developing geothermal resources.

There is much geological, geophysical, and other necessary construction work that can take place during the 10-year period and which will still allow for appropriate drilling and in a timely manner. Changes in the diligence requirements does not insure that overall development will be done the most efficiently and expeditiously.

However, we must concede that the provisions of S. 883 would be satisfactory to us. Union strongly opposes section 5 of S. 558, which provides the Secretary to set aside land for lease to public buyers. Although this 10 percent set aside is found in the Coal Leasing Amendment Act of 1976, the comparison of geothermal leases to other types of leases is inappropriate.

The value of coal leases can be proven relatively easily and there are numerous experts in this area. However, the heart of a geothermal resource frequently might be located in a small area. The practical effect could be to withdraw such lands from development and give such public bodies an unfair competitive advantage over the private sector. It would enable public bodies to apply for the cream of the geothermal areas for lease.

Furthermore, there is no way to determine which leases will be made available or how such leases will be identified.

It is our information that the principle argument made by the rural electric cooperatives in favor of a 10-percent and set-aside is their requirement of public notice prior to bidding on particular pieces of land. This is a real concern; there are other ways to solve the problem.

I have not commented on all the provisions of both bills, but have only discussed some of the most significant ones. Although both bills contain the most important provision of all, the acreage increase, for the reasons previously outlined, we support S. 883 and are opposed to S. 558. However, we will be pleased to work with your staff and others to make improvements in any bill.

Thank you very much for permitting me to express my views and I will answer any questions you desire.

[The prepared statement of Captain Cole follows:]

STATEMENT OF CAPT. E. WILLIAM COLE, VICE PRESIDENT, WASHINGTON OFFICE, UNION OIL CO. OF CALIFORNIA

My name is William Cole. I am Vice President, Washington Office, Union Oil Company of California. Union Oil Company is here to support and urge the enactment of legislation which will promote the development of geothermal energy.

Before commenting on geothermal legislation, I should like to present some background information on geothermal energy its potential; the contributions it can make to our Nation, and Union Oil Company's involvement in the development of geothermal energy.

Geothermal energy can best be defined as the natural heat of the earth captured in fluids trapped in rock formations thousands of feet beneath the surface of the earth. In most places around the world, the heat source--molten rock, or magma--lies too deep for its heat energy to be useful. There are a few areas, though, where the magma has worked itself closer to the surface, slowly transmitting heat to the layers of rock above it. Phenomena such as hot springs, geysers or fumaroles--wisps of steam rising from cracks in the ground--can occur if these heated fluids rise to the surface. Such manifestations can provide indications to earth scientists that an area may have geothermal potential.

The heat of geothermal systems is somewhat low by fossil fuel standards. Although the most efficient utilization of geothermal energy would be for process heat in industrial applications, it can only be transported short distances before there is too much heat and pressure loss. Opportunities for such use are rare, such as space heating in Iceland, the paper industry in New Zealand and certain towns in the United States. Therefore, the most practical use for geothermal energy is to power electrical generating plants. Electricity can then be transported to load centers and used where required. In the United States, a dense power grid now brings geothermal energy within the reach of every city and town. On a worldwide basis, more than 2.8 million kilowatts of installed electrical generating capacity is powered by geothermal energy today.

The geothermal resource may be in the form of dry steam or hot water depending upon conditions which exist within the undergound reservoir. This energy can be harnessed by drilling wells into the productive zones, much as is done for oil or natural gas, and bringing this steam or hot water to the surface.

Different types of geothermal resources require different types of production systems. If the resource is a dry stream, or vapor-dominated, reservoir, the impurities and tiny rock particles are removed in a separator. Then the resulting clean steam is piped directly to an electrical generating plant where it turns the turbine in much the same way as steam produced in a boiler heated by burning oil or coal.

If the resource is a hot water, or liquid-dominated, reservoir, the heat energy can be utilized in two ways. The first is called the "flash" method. The hot water is brought to the surface and the pressure is reduced in special equipment, allowing a portion of the fluid to vaporize, or "flash," into steam. The steam can be used in the same way as natural dry steam after this separation. The unflashed hot water is returned to the reservoir through injection wells.

A second type of hot water production system is called the vapor-turbine method, or binary cycle. Geothermal hot water is brought to the surface and contained in a closed system under pressure at its original temperature and liquid condition. These geothermal fluids are pumped through heat exchangers where the heat gasifies a separate working fluid which cirulates in a closed system and is used to drive a turbine. The geothermal fluids, after yielding their heat, are returned to the underground reservoir through injection wells.

The heat energy of most geothermal systems is normally well above the boiling point--in the range of 300 to 600 degrees Farenheit. To use this energy most efficiently, electrical generating plants must be built within the geothermal field, thus avoiding excessive heat and pressure losses which can occur if the resource is transported by pipeline much more than one mile.

When earth scientists search for geothermal energy, their objective is to locate those areas with the potential for high temperature geothermal resources which can be used to power electrical generators. Reservoir temperature and permeability are generally the most important physical properties which determine the chemical and physical processes at work within the reservoir and the production techniques to be used to develop the resource.

Various geological, geochemical and geophysical surveys and studies are conducted to provide critical data on an area and guide selection of a drillsite. However, the existence of a geothermal reservoir and its suitability for commercial production can only be determined with certainty by drilling wells.

Specially-equipped rotary drilling rigs are used for geothermal wells with the size varying according to the projected depth and the specific geologic formation objective. The high temperatures and hard rock formations encountered, however, present unique challenges.

High temperatures reduce adverse effects on drilling fluids, cement and equipment, requiring the use of specially-formulated muds and cements. In addition, compressed air is often used as a circulating medium when the well reaches the producing zone in order to prevent damage to the formation.

A geothermal reservoir normally occurs in hard, igneous or meta-morphic rock, unlike the softer sedimentary formations associated with petroleum deposits. This put additonal stress on drilling equipment and slows penetration rates. Special tools have been developed to meet the high-temperature, high-strength needs of the geothermal industry.

On a nationwide scale in the United States, some experts believe that there is a geological opportunity to develop geothermal resources sufficient to power twenty million kilowatts of electrical generating capacity by the year 2000.

This would be the equivalent of about 700,000 barrels of crude oil per day, or about 8.5 percent of today's U.S. crude oil production.

In some parts of the nation, geothermal energy could make an even more significant contribution. In Califronia, for example, studies indicate that geothermal energy resources could power a generating capacity sufficient to meet 25 percent of the state's electrical needs.

This amount of generating capacity powered by domestic energy sources would result in a foreign exchange savings of nearly $6.5 billion annually in 1983 dollars for the U.S., a significant move toward reducing dependency on foreign energy sources and improving America's balance of payments.

Union Oil Company of California is the world's largest producer to geothermal energy, supplying natural steam to power more than 1.5 million kilowatts of electrical generating capacity in the United States and the Philippines.

The following is a brief review of the specific projects where Union has applied its techincal expertise in developing geothermal energy.

The Geysers. Union is the principal operator in The Geysers geothermal field, the world's largest and most successful geothermal development, located in California's Sonoma and Lake counties, about 90 miles north of San Francisco. There, Union supplies geothermal energy to nearly 974,000 kilowatts of installed electrical generating capacity operated by Pacific Gas and Electric Company (PG&E). Production facilities are being expanded to supply steam for another 220,000 kilowatts of generating capacity which is under construction. Estimates indicate that when The Geysers field is fully developed during the 1980's, Union and others will be producing enough natural steam to power about two million kilowatts of generating capacity.

Imperial Valley. Located in southeastern California, the Imperial Valley has been termed the "Saudi Arabia" of the world's geothermal resources. Beneath this rich agricultural land lie hot water geothermal reserviors which may be capable of powering more than three million kilowatts of electrical generating capacity. At the present time, 20,000 kilowatts of electric power is being generated from geothermal energy.

The Philippines. Union has developed two major hot water geothermal areas--Makiling-Banahao and Tiwi on the island of Luzon. These are operated under an agreement with the National Power Corporation, an agency of the Philippine government.

The Makiling-Banahao project is 35 miles south of Manila. A total of 220,000 kilowatts of generating capacity is supplied by Union wells and another 110,000 kilowatts of capacity is planned. The Tiwi project is located 200 miles south of Manila. Union is supplying steam to power 330,000 kilowatts of generating capacity.

The Philippines is now the second largest producer of geothermal energy. Continued exploration of the resource could lead to a doubling of the electrical generating capacity in these two areas. Geothermal development in the Philippines has reduced that nation's dependence upon expensive foreign oil supplies. The geothermal energy to power each 110,000 kilowatts of generating capacity represents a crude oil equivalent of about 1.5 million barrels of oil per year.

Japan. Union is the operator for a joint venture to explore for and develop geothermal resources on Japan's northernmost island of Hokkaido. The prospects being explored include the Dohtoh area, approximately 160 miles northeast of Sapporo, and the Esan area, 75 miles southwest of Sapporo.

Indonesia. Union has entered into a joint operation contract with the Indonesian state oil company, Pertamina, to develop the geothermal resources on the slopes of Mt. Salak, approximately 40 miles south of Jakarta on the Island of Jawa. It is interesting to note that although Indonesia has large petroleum reserves, it is developing its geothermal resources so it can provide jobs and energy for the country while exporting its petroleum to earn export credits.

Turkey. Union has entered into discussion with the Turkish Government with a view toward development of their geothermal resources.

Italy. This is another country where we have had discussions with respect to the possibility of developing their resources.

It is important to note that most of the work done to date to develop geothermal energy in the United States, from creating new technology to exploring new lands, has been done by private industry.

Geothermal projects can also be economically beneficial to the community. The Geysers project is a good example. It makes a sizable contribution to the Sonoma County economy, while at the same time demanding very little in the way of public service or expense.

For example, in 1982 the project paid more than $10 million in property taxes to the county and school districts in Sonoma County. Local purchases by the companies involved amounted to approximately $35 million. The annual payroll for 233 employees was about $8 million.

This resulted in a total basic economic contribution of approximately $53 million. Assuming that each dollar will turn over at least 2 1/2 times before leaving the community, a conservative estimate, The Geysers project contributed about $132.5 million annually to the community economy or "gross community product" in 1982. In addition, royalties from The Geysers amounted to $15 million - $6 million to private landowners and $9 million to the State and Federal Governments. For 1983, these numbers will be higher.

Despite this important economic contribution, geothermal operations do not foster heavy population growth--they do not require bringing in a lot of people to get the job done. The non-local personnel utilized are well trained and educated technicians, who have historically made positive contributions to the community. Geothermal operations make small demands on public services, do not add to traffic congestion, or impose major changes on the life style of a community.

For instance, Union Oil's Imperial Valley drilling pads take up very little agricultural area, allowing crops to grow right up to the edge of operations. It is expected that a number of wells can be drilled from each location. Careful environmental protection measures are practiced throughout all phases of operations.

Geothermal energy is a clean and useful addition to the energy generation spectrum, and its development in the Imperial Valley should offer numerous benefits to the community and the state.

Now let us focus on the legislation before us today, S. 558 and S. 883. With respect to any geothermal legislation, the most important provision to promote the development of geothermal energy in the United States, is the necessity to increase the acreage limitations. The areas considered geologically most promising for geothermal development are the eleven western states, which are also the states where the Federal Government owns the bulk of the land. The small amount of acreage operators are currently allowed to hold severely restricts the development of geothermal resources. If acreage from these lands, which is available for prospecting, is not increased, the development of the Nation's geothermal resources will indeed be slow. This becomes quite apparent when one considers that the United States Geological Survey has designated 3.4 million acres as Known Geothermal Resource Areas (KGRA) and over 100 million acres as Areas Valuable Prospectively (AVP).

If we are held to the current 20,480 acres per state, it will take an interminable time for the industry to explore and develop these lands. The geothermal industry requires highly skilled technical personnel to explore and develop this unique resource. The restrictive acreage limitation severely handicaps the successful operator since two discoveries in a state effectively eliminate a company from additional exploration. Therefore, once a skilled group of technical personnel are trained, there are insufficient resources to allow them to continue an orderly progression of exploration and development. This is not an effective use of skilled manpower and wastes valuable assets. In fact, in some areas, we and other companies have approached the acreage limit and will have to slow down development.

This is indeed tragic since we have a proven alternate energy resource which can safely be more expeditiously developed without massive government assistance, yet we are restricted in doing so. Even the original Geothermal Steam Act of 1970 recognized that 20,480 acres could be too restrictive; and, upon certain findings by the Secretary of Interior, provided for an increase to 51,200 acres fifteen years after the date of the Act.

In view of the Nation's energy supply, experience with the present restriction, and current methods of operation, we strongly support the immediate increase of the acreage limitation. Both S. 558 and S. 883 contain provisions that would increase the acreage limitations. In fact, this is the only provision in the bill that really needs to be enacted in order to promote the development of geothermal energy. To a large extent it is the restrictive acreage limitation that has resulted in our extensive geothermal activities overseas instead of development of domestic geothermal resources.

Another provision in both bills which we support is the definitional change for Known Geothermal Resource Areas (KRGAs). It makes good sense to base the KGRA decision on geologic evidence rather than economic speculation. This change will benefit the cost-sensitive geothermal industry by eliminating the up-front costs of competitive leasing in those areas where no sound justification for a KGRA designation exists. It also has the advantage of proving leases through drilling.

Both S. 558 and S. 883 contain a non-cash bonus bidding provisions. Geothermal leases and geothermal development are significantly different in their development from OCS leases or other energy resource leases to the extent that such a provision would deter rather than promote the development of geothermal energy. For example, when one discovers an oil or gas well, he instantaneously has a valuable asset, which he can use to promote further capital and additional development, and the returns may be immediate. However, in the geothermal area, it takes many years between the discovery of one geothermal well and the ability to realize income as a result of the discovery. In fact, numerous wells, a proven resource, and a sales contract with a utility may take from 6 to 12 years to develop and are necessary before one can realize a return on his investment. For this reason, non-cash bonus bidding encourages speculation rather than genuine developers. The experience in California, where non-cash bonus bidding is permittedon state lands, has shown that bids in some instances of 95 percent royalty are made with the result that nothing has been done to develop these leases.

While we think the existing environmental laws completely provide the necessary authority to protect National Parks and monuments, we recognize the sensitivities with respect to "Old Faithful", Yellowstone National Park and parks of that nature. Accordingly, we support the parks language of S. 883. Although we certainly do not want any harm to come to any "national significant thermal features", we think the provisions of Section 11 of S. 558 requiring the Secretary of Interior to identify and publish a list of nationally significant geothermal features and which prohibits leases before certain reviews are conducted is too comprehensive and restrictive. The potential for unnecessarily tying up large amounts of valuable acreage with geothermal potential indefinitely far exceeds the potential for harm. S. 558 creates more bureaucratic delay and red tape before geothermal resources can be developed. Existing environmental impact statements and environmental laws are completely adequate to prevent endangering any nationally or locally important geothermal features.

S. 558 and S. 883 both contain diligence provisions more stringent then existing regulations. Although we heartily support due diligence provisions for geothermal leases, the provisions of S. 558, which require that a plan of operations shall be filed within 3 years and that drilling shall commence no later than 2 years after approval of such a plan, may cause premature drilling and unnecessarily increase the cost of developing geothermal resources. There is much geophysical and other necessary constructive work which can take place during the present 10-year period and which will still allow for appropriate and efficient drilling in a timely manner. In effect, the proposed provision changes what is presently a 10-year development period into a 5-year drilling requirement and requires that a well be drilled within 5 years regardless of the circumstances or the extent of development and knowledge concerning the resources. It does not ensure that overall development will be done more efficiently or expeditiously. In this regard, S. 883, to a lesser extent, also unnecessarily modifies the existing 10-year diligence requirement.

While we can see the merit of provisions of S. 558 and 883, which authorize the Secretary to grant no-cost permits for the use of geothermal resources to the surface owner; we can envision that without careful qualifications and protections, both with respect to the leasee and the surface owner, this provision could impede the development of geothermal resources and might create unforeseen and unintended liabilities.

We support the provisions of S. 558 and 883 which increase from 10 to 20 years the interval between lease negotiations. This provision will provide greater access to the capital markets, provide stability, and assist in acquiring captial.

We strongly oppose provisions of S. 558, which require the Secretary to set aside "a reasonable number of leasing tracts, not to exceed 10 percentum of the acreage leased in any year, to be offered on a basis of a specific application for such tract to public bodies, including rural electric cooperatives or nonprofit corporations." Although this 10 percent set-aside is found in the Coal Leasing Amendment Act of 1976, the comparison of geothermal leases to other types of leases is inappropriate. For example, the value of coal leases can be proven relatively easily and there are numerous experts in this area. Also, there are numerous areas suitable for coal development. However, the heart of a geothermal resource frequently might be located in a small area. Geothermal leases are relatively difficult to prove and require higly skilled personnel who are in short supply. The practical effect could be to withdraw such lands from development, and give such public bodies an unfair competitive advantage over private sector leassees. It would enable public bodies to apply for "the cream" of the geothermal areas for lease.

This section does not specify which leases will be made available or how such leases will be identified. It could result in a split of geothermal resources so as to prevent or deter commercial development. It would, in essence, put government agencies in a commercial venture and give them an unfair competitive advantage. Once again, it creates the situation of government organizations competing with private industry. There are no set-asides for gas, oil, and nuclear leases, and it is not considered appropriate to do so for geothermal.

It is our information that the principle argument made by the rural electric cooperatives in favor of a 10 percent and set-aside is their requirement of public notice prior to bidding on particular pieces of land. The cooperatives argue that under this public notice requirement they are unfavorably discriminated against as public notice prevents them from submitting a sealed bid which is competitive with private companies.

If this is a real concern, then to satisfy the rural electric cooperatives or other public bodies, we should eliminate the 10 percent set-aside and instead propose two bid-due dates in any federal leasing solicitation. Under this proposal, private companies would submit sealed bids by a date certain which would be held by proper federal authority. Rural cooperatives would then have an additional period of approximately 30 days during which they could hold their public hearings and submit their sealed bids. Following the expiration of the 30 days, all bids would be opened at the same time.

I have not commented on all the provisions of both bills, but have only discussed some of the most significant ones. Although both bills contain the most important provision of all, the acreage increase, for the reasons previously outlined, we support S. 883 and are opposed to S. 558. However, we will be pleased to work with staff and others to make improvements in any bill being considered.

Mr. Chairman, we appreciate the opportunity to appear before the committee and express our views. We welcome the committee's continuing efforts to assist in the development of our nation's geothermal resources and wish you every success in obtaining speedy enactment of legislation that will promote the development of geothermal energy. I will be pleased to attempt to answer any questions that you might have.

Senator **Warner**. Do you know of any objection to the increase of 20 to 50?

Captain **Cole**. We do not, Mr. Chairman. We think it is a good idea.

Senator **Warner**. Mr. Wright.

STATEMENT OF ROBERT L. WRIGHT, LAND MANAGER, GEOTHERMAL OPERATIONS, PHILLIPS PETROLEUM CO., AND CHAIRMAN, WESTERN OIL AND GAS ASSOCIATION'S GEOTHERMAL COMMITTEE

Mr. **Wright**. Thank you, Mr. Chairman and members of the committee, for giving me the opportunity to appear today to address S. 558 and S. 883, the Geothermal Steam Act Amendments of 1983.

My name is Bob Wright. I am land manager of geothermal operations for Phillips Petroleum Co. and chairman of the Western Oil & Gas Association's geothermal committee. My comments today represent the views of both Phillips and the WOGA group. To further qualify myself as a witness, I have had some 32 years experience in resource development on public lands covering oil and gas, hard rock minerals and geothermal resources. I have dealt with the leasing aspects of geothermal energy for the past 11 years.

The WOGA committee, which is the only major industry committee to focus on the rules, regulations, and legislation affecting geothermal development, is comprised of some 20 companies, large and small, who are leaders in developing this Nation's geothermal resources. We greatly appreciate the efforts of Senator McClure and Senator Jackson to develop legislation to address the concerns of the geothermal industry, and you, Senator. I was here in 1981 on your Senate bill 1516 and it was a good bill. I wish it would have passed.

Phillips' geothermal operations are headquartered in Salt Lake City with exploration and/or development activities in most of the Western States. We are presently developing the first commercial geothermal project in the United States to be located outside the State of California. Our Roosevelt Hot Springs project under contract with Utah Power & Light will be furnishing steam for generating electricity in April of 1984. The project is located on Federal leases in southwestern Utah.

We are also in the final testing stages at our Desert Peak project located east of Reno, Nev., which should be in production in 1985. The project is also located on Federal lands.

I have carefully studied both Senate bills S. 558 and S. 883 and both bills contain the most important provision necessary in any legislation, to promote geothermal energy and that provision is the Federal acreage increase.

Both bills would increase from 20,480 to 51,200 acres, the maximum Federal leaseholding by any one party per State. This most important change will result in a more aggressive exploration and development program for geothermal resources on the public domain.

In view of the fact that there are estimated to be over 100 million acres of Federal lands classified as areas valuable for prospecting for geothermal, we believe that such an increase will enhance competition within the industry by increasing exploration activities by large and small companies alike.

Under the existing limit, many companies have been forced to give up attractive prospects because they were at or near their acreage limitation. The acreage limitation was originally intended to promote competition and prevent speculation. However, the limitation has actually hindered geothermal development because a single prospect often places a company or individual at the acreage ceiling.

Raising the limitation allows larger potential development areas to be created. Current diligent requirements will still insure that leases are developed in a timely manner, if it is warranted, or they will simply be released.

Both of the bills contain a change in the definition of a known geothermal resource area based upon geological evidence rather than economic speculation and also provide that the applicant or the lessee responsible for exploration resulting in the KGRA definition distinction is entitled to the noncompetitive lease for which he had first applied. This is a much needed and desirable amendment.

The provisions of S. 883 pertaining to the protection of Yellowstone Park and its relation to Island Park are adequate and will protect the thermal features of these areas. On the other hand, we feel the provisions of S. 558 calling for the Secretary of the Interior to identify and publish a list of nationally significant geothermal features describing geographic zones outside the boundaries of national parks and in addition to national monuments is unnecessary and will result in a delay of geothermal resource development.

The NEPA process and existing environmental laws insure the protection of important geothermal features.

Both bills contain provisions for noncash bonus bidding. In our opinion, noncash bidding encourages speculation rather than sincere development. The up-front investment of cash for leases does more than anything to insure diligent development, particularly in view of the very long period associated with geothermal resources before any cash flow or return on investment may be realized.

The California experience where a State noncash bidding system is employed, has encouraged speculative acquisitions which have not led to development. If this committee feels that a noncash bidding amendment is necessary, then we prefer S. 883 which limits it to 5 percent of the acreage offered in KGRA's until 1987.

We heartily support the provisions of S. 883 allowing extension of lease terms. This amendment is especially crucial right now at this time, because the majority of the most valuable leases in existence today were issued in 1974 and are approaching the end of their primary term next year 1984. The extended term will allow developers time to formulate long-range plans for development of the resource and assure utilities that the lessee will have security of tenure sufficient to justify the planning and construction of a generating facility costing millions of dollars.

S. 558 and S. 883 both contain diligence provisions. S. 558 requires a plan of operations to be filed within 3 years of lease issuance with drilling commencing no later than 2 years after approval of the plan. S. 883 requires a plan of operations to be filed within 5 years with drilling commencing no later than 4 after approval of the plan.

We believe these provisions will result in the premature release of acreage and unnecessarily increase the cost of developing geothermal resources. The drilling requirements have the effect of shortening the primary term and impeding logical and complete geological and geophysical evaluation necessary for informed drilling decisions. We think the present law ensures diligent development.

I have not attempted to address each and every provision of the bill but have concentrated——

Senator WARNER. I don't think that is necessary.

[The prepared statement of Mr. Wright follows:]

STATEMENT OF ROBERT L. WRIGHT
PHILLIPS PETROLEUM COMPANY
AND
WESTERN OIL AND GAS ASSOCIATION
GEOTHERMAL COMMITTEE
BEFORE THE
SENATE SUBCOMMITTEE FOR ENERGY AND MINERAL RESOURCES
WASHINGTON, D. C.
MAY 2, 1983

THANK YOU MR. CHAIRMAN AND MEMBERS OF THE COMMITTEE FOR GIVING ME THE OPPORTUNITY TO APPEAR TODAY TO ADDRESS S.558 AND S.883, "THE GEOTHERMAL STEAM ACT AMENDMENTS OF 1983".

MY NAME IS BOB WRIGHT. I AM LAND MANAGER OF GEOTHERMAL OPERATIONS FOR PHILLIPS PETROLEUM COMPANY AND CHAIRMAN OF THE WESTERN OIL AND GAS ASSOCIATION'S (WOGA'S) GEOTHERMAL COMMITTEE. MY COMMENTS TODAY REPRESENT THE VIEWS OF BOTH PHILLIPS AND THE WOGA COMMITTEE. TO FURTHER QUALIFY MYSELF AS A WITNESS ON THESE BILLS, I HAVE HAD SOME 32 YEARS EXPERIENCE IN RESOURCE DEVELOPMENT ON PUBLIC LANDS COVERING OIL AND GAS, HARD ROCK MINERALS AND GEOTHERMAL RESOURCES. I HAVE DEALT WITH THE LEASING ASPECTS OF GEOTHERMAL ENERGY FOR THE PAST ELEVEN YEARS.

THE WOGA COMMITTEE, WHICH IS THE ONLY MAJOR INDUSTRY COMMITTEE TO FOCUS ON THE RULES, REGULATIONS AND LEGISLATION AFFECTING GEOTHERMAL DEVELOPMENT, IS COMPRISED OF SOME TWENTY COMPANIES, LARGE AND SMALL, WHO ARE LEADERS IN DEVELOPING THIS NATION'S GEOTHERMAL RESOURCES. WE GREATLY APPRECIATE THE EFFORTS OF SENATOR MCCLURE

AND SENATOR JACKSON TO DEVELOP LEGISLATION TO ADDRESS THE CONCERNS OF THE GEOTHERMAL INDUSTRY.

PHILLIPS' GEOTHERMAL OPERATIONS ARE HEADQUARTERED IN SALT LAKE CITY WITH EXPLORATION AND/OR DEVELOPMENT ACTIVITIES IN MOST OF THE WESTERN STATES. WE ARE PRESENTLY DEVELOPING THE FIRST COMMERCIAL GEOTHERMAL PROJECT IN THE UNITED STATES TO BE LOCATED OUTSIDE THE STATE OF CALIFORNIA. OUR ROOSEVELT HOT SPRINGS PROJECT, UNDER CONTRACT WITH UTAH POWER AND LIGHT, WILL BE FURNISHING STEAM FOR GENERATING ELECTRICITY IN APRIL, 1984. THE PROJECT IS LOCATED ON FEDERAL LEASES IN SOUTHWESTERN UTAH.

WE ALSO ARE IN THE FINAL TESTING STAGES AT OUR DESERT PEAK PROJECT, LOCATED EAST OF RENO, NEVADA, WHICH SHOULD BE IN PRODUCTION IN 1985. THIS PROJECT IS ALSO LOCATED ON FEDERAL LANDS.

I HAVE CAREFULLY STUDIED S.558 AND S.883. BOTH BILLS CONTAIN THE MOST IMPORTANT PROVISION NECESSARY IN ANY LEGISLATION TO PROMOTE THE DEVELOPMENT OF GEOTHERMAL ENERGY IN THE UNITED STATES. THAT PROVISION IS THE INCREASE IN FEDERAL LEASE ACREAGE LIMITATIONS.

BOTH BILLS WOULD INCREASE FROM 20,480 ACRES TO 51,200 ACRES THE MAXIMUM FEDERAL LEASEHOLDING BY ANY ONE PARTY PER STATE. THIS MOST IMPORTANT CHANGE WILL RESULT IN A MORE AGGRESSIVE EXPLORATION AND DEVELOPMENT PROGRAM FOR GEOTHERMAL RESOURCES ON THE PUBLIC DOMAIN. IN VIEW OF THE FACT THAT THERE ARE ESTIMATED TO BE OVER 100 MILLION ACRES OF FEDERAL LANDS CLASSIFIED AS AREAS VALUABLE FOR PROSPECTING FOR GEOTHERMAL RESOURCES, WE BELIEVE THAT SUCH AN INCREASE WILL ENHANCE COMPETITION WITHIN THE INDUSTRY BY INCREASING EXPLORATION ACTIVITIES BY LARGE AND SMALL COMPANIES ALIKE.

Under the existing limit, many companies have been forced to give up attractive prospects because they were at or near the acreage limitation. The acreage limitation was originally intended to promote competition and prevent speculative holdings. However, the limitation has actually hindered geothermal development because a single prospect often places a company or individual at the acreage ceiling. Raising the acreage limitation allows larger potential development areas to be created. Current diligent requirements will still ensure that leases are developed in a timely manner, if warranted, or they will simply be released.

Both bills contain a change in the definition of a Known Geothermal Resource Area (KGRA) based upon geological evidence rather than economic speculation and also provide that the applicant or lessee responsible for exploration resulting in a KGRA is entitled to the noncompetitive lease for which he had first applied. This is a much needed and desirable amendment.

The provisions of S.883 pertaining to the protection of Yellowstone Park and its relation to Island Park are adequate and will protect the thermal features of these areas. On the other hand, we feel that the provisions of S.558 calling for the Secretary of the Interior to identify and publish a list of nationally significant geothermal features describing geographic zones outside the boundaries of national parks and national monuments is unnecessary and will result in a delay of geothermal resource development. The NEPA process and existing environmental laws ensure the protection of important geothermal features.

BOTH BILLS CONTAIN PROVISIONS FOR NON-CASH BONUS BIDDING. IN OUR OPINION, NON-CASH BIDDING ENCOURAGES SPECULATION RATHER THAN GENUINE DEVELOPMENT. THE UP-FRONT INVESTMENT OF CASH FOR LEASES DOES MORE THAN ANYTHING TO ENSURE DILIGENT DEVELOPMENT, PARTICULARLY IN VIEW OF THE VERY LONG DEVELOPMENT PERIOD ASSOCIATED WITH GEOTHERMAL RESOURCES BEFORE ANY CASH FLOW OR RETURN ON INVESTMENT MAY BE REALIZED. THE CALIFORNIA EXPERIENCE WHERE A STATE NON-CASH BIDDING SYSTEM IS EMPLOYED, HAS ENCOURAGED SPECULATIVE ACQUISITIONS WHICH HAVE NOT LED TO RESOURCE DEVELOPMENT. IF THIS COMMITTEE FEELS THAT NON-CASH BIDDING IS NECESSARY, THEN WE PREFER S.883 WHICH LIMITS THE NON-CASH METHOD TO NO MORE THAN 5 PERCENT OF ACREAGE OFFERED IN KGRA'S UNTIL 1987.

WE HEARTILY SUPPORT THE PROVISIONS OF S.883 ALLOWING EXTENSION OF LEASE TERMS. THIS AMENDMENT IS ESPECIALLY CRUCIAL AT THIS TIME BECAUSE THE MAJORITY OF THE MOST VALUABLE LEASES IN EXISTENCE TODAY WERE ISSUED IN 1974 AND ARE APPROACHING THE END OF THEIR PRIMARY 10-YEAR TERM NEXT YEAR. THE EXTENDED TERM WILL ALLOW DEVELOPERS TIME TO FORMULATE LONG-RANGE PLANS FOR DEVELOPMENT OF THE RESOURCE AND ASSURE UTILITIES THAT THE LESSEE WILL HAVE SECURITY OF TENURE SUFFICIENT TO JUSTIFY THE PLANNING AND CONSTRUCTION OF A MAJOR GENERATING FACILITY COSTING MILLIONS OF DOLLARS.

S.558 AND S.883 BOTH CONTAIN DILIGENCE PROVISIONS. S.558 REQUIRES A PLAN OF OPERATIONS TO BE FILED WITHIN THREE YEARS OF LEASE ISSUANCE, WITH DRILLING COMMENCING NO LATER THAN TWO YEARS AFTER APPROVAL OF THE PLAN. S.883 REQUIRES A PLAN OF OPERATIONS TO

BE FILED WITHIN FIVE YEARS WITH DRILLING COMMENCING NO LATER THAN FOUR YEARS AFTER PLAN APPROVAL.

WE BELIEVE THESE PROVISIONS WILL RESULT IN THE PREMATURE RELEASE OF ACREAGE AND UNNECESSARILY INCREASE THE COST OF DEVELOPING GEOTHERMAL RESOURCES. THE DRILLING REQUIREMENTS HAVE THE EFFECT OF SHORTENING THE PRIMARY LEASE TERM AND IMPEDING LOGICAL AND COMPLETE GEOLOGICAL AND GEOPHYSICAL EVALUATION NECESSARY FOR INFORMED DRILLING DECISIONS. WE THINK THAT PRESENT LAW ENSURES DILIGENT DEVELOPMENT.

I HAVE NOT ATTEMPTED TO ADDRESS EACH AND EVERY PROVISION OF BOTH BILLS BUT HAVE CONCENTRATED ON WHAT WE FEEL ARE THE MOST SIGNIFICANT POINTS OF EACH. AND, FOR THE REASONS STATED ABOVE WE SUPPORT S.883.

AGAIN, THE MOST IMPORTANT PROVISION OF BOTH BILLS IS THE ACREAGE INCREASE PROVISION WHICH IS DESPERATELY NEEDED BY THE INDUSTRY AT THIS TIME.

THANK YOU FOR THE INVITATION TO ALLOW US TO COMMENT ON THIS LEGISLATION WHICH IS SO IMPORTANT TO THE GEOTHERMAL INDUSTRY. I WOULD BE HAPPY TO RECEIVE ANY QUESTIONS WHICH THE COMMITTEE MIGHT HAVE.

Senator **Warner**. I have a few questions here central to the issue and I am anxious to pursue all of those questions, because I think for myself and my colleagues the answers to those questions will be quite determinative of the scope of this markup session. If we may, we will continue on with Mr. Robbins.

STATEMENT OF GARLAND ROBBINS, MANAGER, GEOTHERMAL DIVISION, SUNOCO ENERGY DEVELOPMENT CO.

Mr. **Robbins**. Mr. Chairman, my name is Garland Robbins. I am the manager of the geothermal division for the Sunoco Energy Development Co. I believe since you have our written testimony for the record, I will just briefly discuss the two points that were included in both bills that we are most interested in.

First, of course, is the increase in the acreage limitation, which Mr. Wright and Mr. Cole have indicated, the current limitation can limit us to one or two prospects in a State. We have found that this limits our potential to such an extent that it is very difficult to obtain funding for a viable geothermal exploration program.

So we feel that it is mandatory that we increase this limitation to the 51,200 included in both bills.

The other area that we would like to discuss relates to the diligence provision that is also included in both bills. Under the current Leasing Act, the primary term of a lease is 10 years. This can only be extended if you are conducting operations at the end of 10 years where you can obtain a 5-year extension or if you have discovered resources in commercial quantities and negotiated a contract for sale.

The situation that is difficult for us is that in Dixie Valley, Nev., where we conducted exploration for a number of years, we have spent several tens of millions of dollars drilling and testing geothermal wells and have been attempting to negotiate a contract with the local utility for several years.

The problem we have uncovered here is that the diligence provision is about to expire. We find very little incentive for the utility company to negotiate with us. We feel that the provisions in both bills, which would allow an extension for the demonstration of marginal economics, would be very advantageous and would help us in our even-handed negotiations.

These are the only two provisions we would like to discuss and I would be happy to answer any questions.

[The prepared statement of Mr. Robbins follows:]

STATEMENT OF GARLAND ROBBINS, MANAGER, GEOTHERMAL DIVISION, SUNOCO ENERGY DEVELOPMENT CO.

Mr. Chairman, my name is Garland Robbins. I am the Manager of the Geothermal Division for the Sunoco Energy Development Company, a subsidiary of the Sun Company, Inc. I appreciate this opportunity to present our views on this important legislation. SUNEDCO has been active in geothermal exploration and development for several years and would very much like to be in the business of producing geothermal resources for the purpose of supplementing conventional resources as an electric power plant fuel. Whether we are able to accomplish that objective depends to a large degree on the fate of the bills before you today.

We have reviewed the bills S. 883 and S. 558 and find that they both provide relief for the two most significant constraints which face the emerging geothermal industry today. These are access and tenure on public lands for exploration and development. Admittedly, there are other federal statutes that have a significant role in the development of geothermal energy. Two examples are the Public Utility Regulatory Policies Act and the Energy Tax Act. However, neither of these laws is as immediately critical as the Geothermal Leasing Act of 1970. That Act and its implementing regulations control access to and the development of the vast majority of the most promising geothermal resources identified in the United States.

Why Legislative Changes are Needed Now

When the Geothermal Steam Act originally became law in 1970, little was known about the extent or the nature of the United States' reserves of this resource. We frankly had little comprehension of the technological problems which might be encountered in its development to the point of commercialization. For example, since 1970 most of the major, promising geothermal finds outside the Geysers area of California have been liquid-dominated or "hot water" resources. This is markedly different from the vapor-dominated or "steam" resource common to the Geysers field, which was the only producing area in the U.S. when the original geothermal law was passed. The generating technology which worked successfully in the Geysers is totally inapplicable to these new, hot water resource fields. And, as I'll discuss later, the technology to capture this energy source efficiently is just now being developed.

Since 1970 we have also learned much about the vast potential of this resource. Although exploration for geothermal is an inexact and very expensive science under present technology, there is no question but that the United States has been blessed with huge reserves. Geologists' predictions vary considerably, but a conservative estimate of domestic reserves suggests the capacity to generate between 6000 and 9500 MW of electricity. Our own Department of Energy projects geothermal generating capacity of 20,000 MW. For purposes of comparison, the DOE reserve estimate would be the equivalent of 40 medium-sized coal-fired power plants.

In sum, since 1970 when the Congress last focused on geothermal leasing, we've established two important new facts:

1) The U.S. has significant geothermal energy potential; and,
2) The reserves are proving to be significantly different from the easily captured "steam" resource of the old Geysers field.

These facts make a new look at the 1970 leasing law quite appropriate.

The Acreage Limitation

One of the earliest recognized constraints to large scale geothermal development noted under the existing law was the limitation of 20,480 acres per entity, per state for federal leases. Twenty-thousand acres is simply not enough territory to explore in one region, let alone an entire state. The acquisition and delineation of a resource base sufficient to justify the investment necessary to construct a power plant and necessary transmission facilities may require the exploration of twenty-thousand acres in a single, promising valley. In order to protect its position, and due to the uncertainties of the exact location of a commercially viable resource, the explorer must lease additional acreage around its original prospect in order to move its operations in directions indicated by its ongoing geophysical work and drilling.

Utilization of geothermal energy to generate electricity is a very capital intensive business. It can take many millions of dollars to prove up an economically viable site. Then, in order to earn a return once a produceable resource has been identified, the developer must secure sales contracts. These contracts in turn will lead to the construction and operation of a generating facility which can economically utilize the resource at its production site, regardless of how remote. Thus, the market for the resource is obviously limited by its proximity to a utility company which can purchase and then market the electricity. To make the sale of geothermal energy even more complex, the rates which can be paid for this generating capacity are governed by state public service commissions and the complex concept of "avoided costs" contained in PURPA.

As I mentioned earlier, many of the technological problems encountered in the development of generation equipment to utilize the new "hot water" geothermal resources are just now being resolved. The first generation binary plant of commercial scale is presently being constructed in the Imperial Valley by San Diego Gas and Electric. If successful, both technologically and economically, this plant will demonstrate the viability of the binary heat transfer concept. This technology will tremendously expand the total amount of "recoverable reserves" of geothermal energy in the United States, because of its ability to utilize lower heat resources to indirectly supply the energy to generate electricity. However, the plant is not yet in commercial operation, and the technology questions remain largely unanswered.

In short, geothermal is a very high risk, as yet unproven technology outside of the dry steam situation at the Geysers in California. In order to justify being in this business we obviously must have at least the prospect of an economic return to warrant that risk. The key first step in this development process is establishing a sound resource holding. Without an adequate land base for exploration and development as provided for in the bills before you, large scale development of geothermal will not occur in the private sector.

The need for the acreage increase is not and has not been controversial since it was first recognized in legislation introduced more than five years ago. However, failure to rectify this situation--particularly in the face of declining investment in alternative energy technologies--is causing a significant deterioration in interest in geothermal development. This deterioration is evidenced by the decline in the number of companies willing and able to take the risks necessary to develop this clean, all American resource.

Perfecting Lease Tenure

Under Section 6 of the Geothermal Steam Act federal leases have a primary term of 10 years. In order to hold the lease longer than 10 years, the operator must produce the geothermal resource in "commercial quantities." This term is defined as the bringing into production a well capable of producing geothermal in commercial quantities--and the execution of a contract for the sale of the resource to a generating facility to be constructed within 15 years. If drilling operations are actually underway at the expiration of the initial 10-year period the primary lease can be extended to 15 years. In other words, in order to comply we must not only discover a good geothermal resource, but we must also arrange for its production and sale. Unlike oil, gas or coal, there is no broad geographical market for geothermal energy. Since the heat value of this resource is lost if it is transported more than a few thousand feet, the generating facility must be at the resource site. This means that our only viable customers are electric utilities which serve the general areas where the geothermal sites are located. We are finding that an electric utility's ability and willingness to pay a rate for the resource which is sufficient to justify its development is constrained both by law and by the attitude of the purchasing utility itself. The result can be a marginally economic prospect which cannot justify the high cost of full scale development.

The proposed legislation anticipates this situation where a developer: acquires a federal geothermal lease; spends millions of dollars to actively explore the lease; identifies a potentially commercially resource; but, finds that he can't market the resource because the "avoided cost" rates which the utilities offer to purchase the output are too low to justify full scale production.

We find ourselves in just such a situation. SUNEDCO acquired leases in the Dixie Valley of Nevada in 1975. Between 1979 and 1981, we spent tens of millions of dollars drilling exploration wells on those leases. We were very encouraged by the testing of the wells we drilled and have been actively attempting to negotiate a sales contract for over two years. The pressure of meeting the diligence deadline for consummating a sales contract puts us at a bargaining disadvantage with prospective markets even where it appears that the underlying economics look favorable. We think that where such situations evolve, if the developer can show good faith efforts to bring the resource into commercial production, but can demonstrate that the current economics make the risks involved unacceptable, the Secretary should have the authority to extend the deadline. We find this provision not only desirable, but absolutely essential if the private sector is going to continue to take the risks inherent in drilling extremely expensive exploration wells only to find that they can't meet the "commercial quantities" test in the short term.

I appreciate the opportunity of presenting the views of my company on this important legislation, and I will be pleased to answer any questions you may have.

Senator WARNER. Thank you very much.
Mr. Condy.

STATEMENT OF CHARLES T. CONDY, PRESIDENT, CALIFORNIA ENERGY CO.

Mr. CONDY. Thank you very much. My name is Charles Condy. I am president of California Energy Co. of Santa Rosa, Calif. We are a geothermal exploration and developing company from California. I appreciate this opportunity to address this subcommittee.

The California Energy Co. is engaged in the business of acquiring and developing geothermal resources primarily for the production of electricity. It places major emphasis on exploration, development and commercial exploitation of geothermal energy in the Western United States.

The company maintains a compact, highly-qualified technical staff covering a broad range of disciplines including geology, geophysics, geochemistry, hydrogeology, and volcanology. It also has the capability to oversee the design, installation and financing of power plants when necessary or desirable in order to market electrical power.

California Energy Co.'s management and administrative staff includes personnel experienced in all phases of electrical development in the geothermal field. We are dedicated to the development of electricity from geothermal resources. That is all this company does. To us, geothermal energy is a raw material; our primary product is electricity.

As a nation, we must address our long-term needs for electrical power. Electricity must be considered the key factor in this country's energy policy. Longstanding basic industries are becoming increasingly electrified, and our new industries, especially high technology, are based on electronics and will require a great deal of electricity.

In addition, an ever increasing supply of electrical power will be needed to fuel our Nation's economic recovery. Electricity is our most efficient source of energy and is secure within our borders. Unlike some other forms of energy, its availability and price are not subject to the vagaries of geopolitical events beyond our country's control or to the whims of foreign suppliers. Suppliers of electricity in this country are working hard to reduce our Nation's dependence on foreign fuel supplies. But where will the replacements come from?

Southern California Edison, one of our leading suppliers of electricity in our market, reports a projected need of 6,325 MW of new generating equipment during the next 10 years to meet the electrical requirements of its existing and new customers. Southern California Edison is but one of more than 3,000 suppliers of electricity.

Our national goal should be to encourage expansion of new electrical generating facilities from sources that are secure. However, at what cost to society should this expansion be made?

No major enterprise can be carried out without some cost to society. Such costs cannot always be measured in dollars. By definition, development of a natural resource has some consequences for the environment. However, reason must replace emotion when balancing the development of energy for the future with the preservation of our national heritage.

Electricity generated from geothermal resources is the most compatible and the least costly in terms of its environmental impact. One criticism of geothermal energy in the past was that it is site specific, that it must be used within 1 mile of the discovered resource in order to be economical.

However, this constraint also tightly limits the land area affected and becomes a benefit when viewed from an environmental point of view.

Land and the role of Government with respect to its relationship in industry—the impact of the Government on the industry is both expensive and subtle. The industry can survive and thrive on private capital. It cannot be properly developed without extensive use of public lands.

By its nature, geothermal resources are located in areas of volcanic activity. In the United States, areas having electrical generating potential are located mainly in the west where the Federal Government is by far the largest landholder. As a renewable resource, geothermal energy is not finite. Therefore resources not developed now are lost forever. The national interest requires that its geothermal lands be developed expeditiously.

Equity also requires that the opportunity to develop assets owned by the public should be made available to the public. Nevertheless, the current system gives rise to disincentives to exploration and encourages land speculation. Such speculation is totally nonproductive. Though sometimes very profitable, such profits are yet another parasitic burden on the geothermal industry and on U.S. society.

Questions have been raised as to whether electrical power generated from geothermal resources could make a significant impact in our requirements for the future or be timely in its development. However, geothermal energy has been demonstrated to be economically viable in many places throughout the world.

Worldwide geothermal energy on line today stands at 3,500 MW. Most of the energy has been developed within the last 10 years and the pace of development is accelerating. Most notably, in the United States the geysers field is currently producing 1,400 MW and is projected to produce 2,000 within the next few years.

Electricity is now being produced from the Imperial Valley of California and a large potential is anticipated from this resource. The Cascades of northern California and Oregon are estimated by the USGS to contain a potential of 30,000 MW of electrical power. This is the equivalent of 30 nuclear powerplants and enough electricity to supply the needs of 30 million people.

With respect to the time required to develop electricity from geothermal resources, in the absence of institutional restraints, one needs only note that the Union Oil Co. working in conjunction with the Philippine Government have developed 550 MW in 5 short years.

Our company developed 135 MG in Central America in 2½ years and at China Lake, Calif., California Energy Co. anticipates on-line electrical production by mid 1984, which would represent moving from drilling the first well to generating electricity in only 2½ years.

To the point with respect to geothermal energy being exclusively a western resource, we would note that the effect on other fuel prices of savings in California will immediately be reflected in the bills of New England.

CECI has been and shall continue to be committed to the development of electricity from geothermal resources.

Each of the bills pending before the subcommittee provides some correction to the situation.

California Energy Co. very much appreciates the thorough review of the industry's requirements evident from the history of these proposed amendments. It strongly supports enactment of these objectives.

Thank you.

[The prepared statement of Mr. Condy follows:]

STATEMENT OF CHARLES T. CONDY, PRESIDENT, CALIFORNIA ENERGY CO.

Mr. Chairman and Members of the Subcomittee:

My name is Charles T. Condy. I am President of California Energy Company of Santa Rosa, California. I appreciate this opportunity to address the Subcommittee.

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As a nation, we must address our long term needs for electricity. Electricity must be considered the key factor in this country's energy policy. Our new industries, especially those involved in high technology, are based on electronics and will require a great deal of elecricity. In addition, an ever increasing supply of electricity will be needed to power our nation's economic recovery. Electricity is our most efficient source of energy and is secure within our borders. Unlike some other forms of energy, its availability and price are not subject to the vagaries of geopolitical events beyond our country's control or to the whims of foreign suppliers. Suppliers of electricity in this country are working hard to reduce our nation's dependence on foreign fuel supplies. But where will the replacements come from?

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However, this constraint also tightly limits the land area affected and becomes a benefit when viewed from an environmental point of view.

Land - The Role of Government and Industry

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By its nature, geothermal resources are located in areas of volcanic activity. In the United States, areas having electrical generating potential are located mainly in the West where the Federal Government is by far the largest land holder. As a renewable resource, geothermal energy is not finite. Therefore goethermal resources not developed now are lost forever. The national interest requires that its geothermal lands be developed expeditiously.

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CECI has been and shall continue to be committed to the development of electricity from geothermal resources.

Each of the bills pending before the Subcommittee provides some correction to this situation.

California Energy Company very much appreciates the thorough review of the industry's requirements evident from the history of these proposed amendments. It strongly supports enactment of these objectives.

Senator **Warner**. Thank you. I will start with you, sir. We have two questions and if the panel will kindly note the questions as I read them, we will just go down the row.

We have heard today from witnesses about ideas to protect anywhere from 1 to 21 parks with various forms of protection, including studies, buffer zones, public notices, et cetera. What is the industry's opinion of the level of protection that would enable you to continue to go forward and economically develop these resources?

Mr. **Condy**. What we have read in both versions seems to be very good as far as we are concerned. We would be terribly concerned if a tremendous amount of land were being taken away, because they are near national parks. For instance, most of the parks in our county contain a lot of lakes and that the lakes are actually caused by the volcanic eruption. For example, Crager Lake was erupted 7,000 years ago and is about 50 times the size of Mount St. Helen.

We have a buffer zone around the lake and around the park and we are quite satisfied with that. Certainly, we know that we will never get inside and get to drill in the volcano, but we are very happy with the land that has been set aside for us.

Senator **Warner**. If we were to adopt the National Parks and Conservation Association idea of protecting our parks with a buffer zone, how many existing leases or lease applicants may be affected by enforcing such restrictions?

Mr. **Condy**. In our particular case, we are in and around several of those parks, such as Lassen and Crager Lake National Park, Diamond Lake, and we have a buffer zone at this point of about 5 miles and we are more than happy with the provision that we have. But I think in the case of extensive surface manifestations, this does not occur in too many places in Oregon and California as it does, for instance, at Yellowstone.

We think that a careful examination of the potential for the reduction in the surface manifestations and thereby causing the loss of some important national monument, such as Yellowstone, should be very carefully undertaken and we believe that there should be a buffer zone that technically geologists and hydrogeologists after thorough review feel comfortable with.

Senator **Warner**. Mr. Robbins.

Mr. **Robbins**. Mr. Chairman, in relation to park protection of course we feel that the current regulations will protect the existing parks adequately, based on our experience in the past. We prefer primarily that whatever protection is being administered here will be done in a balanced and even-handed manner in order to assure that we can develop the resource.

Of the two bills that are being discussed today, we would support Senate bills 883 over 558. We have no leases presently in the vicinity of the 21 parks that are on the National Parks and Conservation Association's list and I think we will pass on that question.

Mr. **Wright**. Senator, on the park protection language, I believe it was last year, we came up with protection for three parks, namely, Lassen, Rainier, and Yellowstone, and we have no problem with that. When you get into the area of putting buffer zones around national monuments, however, we have a distinct problem there because there are so many national monuments. I am talking about the language in S. 558 here.

As to Yellowstone, we all want to see it protected. I have a little problem when they talk about the Island Park KGRA. There is no Island Park KGRA, ladies and gentlemen. It is a scattered thing that was created by competitive interests when the lands were opened up to filing in 1974. I do not know how you could put a buffer zone around the Island Park KGRA because it is spread over approximately six townships wide, 30 miles of just scattered leases. There is open Federal land that you can file for a dollar an acre all through it right now.

So in answer to your question, if we could identify just the three main parks, Lassen, Rainier, Yellowstone, but do not get into this monument situation, the companies do not seem to have a problem with that.

Captain **Cole**. Mr. Chairman, I have just adopted the remarks of my WOGA friend to my left and leave it at that.

Senator **Warner**. Fair enough. If there are no further witnesses that desire to be heard, the hearing is adjourned.

[Whereupon, at 12:10 a.m., the hearing was adjourned.]

APPENDIX

Additional Material Submitted for the Record

Statement of AMAX Inc.
on S. 883 and S. 558
to Energy and Mineral Resources Subcommittee
Senate Energy and Natural Resources Committee

AMAX Inc. is a worldwide minerals and energy development company who explores for and mines a diversity of minerals including coal, molybdenum, base and precious metals, nickel, tungsten, and oil and gas. AMAX has been active in geothermal exploration in Idaho, Nevada, California, Oregon and Utah.

We are commenting on proposed changes to the Geothermal Steam Act of 1970 and support most of the provisions of S. 883. We believe S. 883 provides the changes necessary to encourage more geothermal exploration and development on our public lands.

The most important provision is the increase in the acreage limitation requirements. From an exploration viewpoint, there are a number of critical reasons why the acreage limit warrants increasing. Geologic characteristics of geothermal resources are such that large acres of land must be evaluated before a prospect can be located. The arbitrary acreage limit bears no relationship to the amount of land normally needed for the initial exploration for one prospect. For instance, in certain portions of Idaho, AMAX believes an adequate evaluation of the geothermal resource may require that approximately 80,000 acres be reviewed in the initial exploration plan. The requirements of the law not only prohibit this one prospect from being evaluated properly but curtail a company's ability to explore in any other part of the state at the same time. The geologic knowledge gained from the evaluation of the first prospect can not be fully utilized and thus limits the benefits the company should gain from its initial investment. As a consequence, the overall growth of geothermal development is limited.

When the limitation of 20,000 acres is applied in an active geothermal resource state such as Nevada with over 75% of the land owned by the Federal government, the pace of geothermal development is slowed even further. Furthermore, when one considers that the prospect dimensions for oil and gas are similar to geothermal, yet the acreage limit on oil and gas is over 200,000 acres, it is difficult to justify the critically small acreage limit placed on geothermal.

We, therefore, encourge the Committee to consider increasing the acreage limit to 50,200 at passage of the Act and provide for an additional discretionary increase by 1985. This is in keeping with H.R. 2058, introduced in the House by Congressman Dan Marriott.

Other areas addressed in S. 883 and S. 558 that AMAX supports include the provision for Secretarial consultations with other effected federal agencies if leases are on public lands.

The redefinition of known geothermal resource areas is important so these areas are determined on a geologic basis rather than on economic speculation. We believe all KGRA's should be determined on this basis and support Sec. 3 of S. 883.

Changes in the diligence requirements as proposed in Sec. 13 of S. 883 are the most acceptable as they allow the leasee the ability to invest capital based on a development plan rather than on a less flexible drilling schedule. The provision in S. 558 which requires drilling within 5 years of lease issuance, is overly restrictive since the knowledge gained from constructive work on each prospect may dictate the need for different drilling schedules. For such a capital intensive, relatively high risk exploration program, any substantial change from the 10 year development and drilling period, can be costly and inefficient and should be opposed.

Provisions AMAX is not in support of in S. 558 include the noncash bonus bidding which can be a disincentive for the development of geothermal resources. If language is adopted, it should limit the amount leased to no more than 5% as written in Sec. 5 of S. 883. Similarly, AMAX is not certain public set-aside language, as a practical matter, enhances geothermal development and questions the need for its inclusion in a bill.

An area of concern to all involved in the geothermal issue is that of protecting the national parks. We believe that existing parks and monuments are already adequately protected but that language assuring that protection, without creating buffer zones, is acceptable. Parks language should result in the protection of the thermal features of the park or monument but in no way should include a blanket prohibition of leasing around every park and monument effectively closing off thousands of acres without any determination that the parks thermal features would be effected. We therefore support the language in S. 883 but cannot accomodate the more restrictive, all encompassing language of S. 558 which establishes buffer zones around the parks.

We appreciate the opportunity to provide this statement for the Committee Record and urge the Committee to endorse Geothermal Steam Act legislation that provides the acreage relief that is so necessary for the sound, continued development of our geothermal resources.

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San Antonio, Texas
WILLIAM C. WALBRIDGE
Seminole Electric Cooperative
Tampa, Florida
ROBERT C. YOUNG
Burlington, Vermont

1983 MAY 18 AM 10:31

May 16, 1983

Honorable John Warner
Chairman, Subcommittee on Energy
 and Mineral Resources
405 Russell Senate Office Building
Washington, D. C. 20510

Dear Senator Warner:

On behalf of the American Public Power Association, I am writing you on an issue that is currently before your subcommittee -- amendments to the Geothermal Steam Act of 1970.

APPA is the national service organization representing over 1,750 local publicly owned electric utilities throughout the country. Collectively, more than 13.5 percent of the nation's consumers are served by public power systems. Publicly owned systems are actively exploring all feasible means of providing the energy services demanded by their customers at the lowest possible cost.

Many public power systems are developing the power production potential of known geothermal resources, and many others are exploring the feasibility of such ventures. To encourage the continued involvement of local public power systems in the use of this resource, we believe that certain changes should be made to S. 883. In particular, a provision should be added to the bill which reserves a reasonable number of lease tracts for leasing by public bodies and rural electric cooperatives. Also, we believe the legislation should encourage the use of alternatives to the cash bonus bidding system.

During the 96th Congress, the Senate passed a bill, S. 1388, which contained provisions such as we are advocating today. Section 128 of that measure, for example, provided that "a reasonable number of leasing tracts, not to exceed 10 per centum of the acreage leased in any year, shall be offered on the basis of a specific application for such tract in accordance with this section to public bodies, including rural electric cooperatives, or nonprofit corporations controlled by and predominantly made up of any of such entities." This lease "set aside" was conditioned on the requirement that these public bodies or cooperatives develop the resource and produce energy for their own use or for sale to their members or customers.

While we supported this provision of S. 1388, we believe it would be more appropriate to set a floor rather than a ceiling for such a "set aside." We would thus recommend that the language of section 128 of S. 1388 be modified to require that at least 10 percent of the acreage be offered to public bodies and electric cooperatives, and that it then be incorporated in S. 883.

We believe there are a number of very persuasive public policy arguments for establishing such a lease "set aside" program, including the following:

1. This is a modest and reasonable proposition. Whether the Secretary is required to set aside a reasonable number of tracts up to a certain percentage, or no less than a certain percentage, the requirement would not tie up for any extended period a particular number of leases. If there were insufficent interest in the tracts so reserved, they could then be leased to other interested parties.

2. The federal government is in the position of a trustee, holding these lands for the benefit of the general public. The public, acting through their local or state governments or through nonprofit corporations, should have an opportunity to develop and utilize this resource. It is certainly not unreasonable to reserve 10 percent of the public's geothermal resources for direct development by the public.

3. Many public power systems throughout the country operate under "sunshine" laws which place them at a competitive disadvantage vis-a-vis private corporations in a sealed bid situation. Because a municipality's bid is public knowledge, a private entity may easily submit a slightly higher bid and thereby secure the lease. In addition to state statutes, many municipal corporations have adopted local ordinances to the same effect.

4. Public development of energy resources can serve as a yardstick by which the performance of private developers can be measured. This form of competition serves to hold down both the cost of development as well as the cost of the final product.

5. The lease "set aside" provisions we are advocating are consistent with policies contained in other federal statutes which have granted a first option to develop and use public resources to public bodies and rural electric cooperatives. For example, public power systems and rural electric cooperatives have preference in the purchase of federal surplus hydroelectric power, public bodies have preference in licensing of hydroelectric sites, and preference in coal leasing on federal lands is granted to public bodies and rural electric cooperatives under section 2 of the Mineral Lands Leasing Act.

APPA also recommends certain changes in the language of S. 883 regarding alternatives to the cash bonus bidding system. S. 883 appears to incorporate the provisions of S. 1388 in the 96th Congress, with two exceptions. First, under S. 883, the Secretary may offer up to 5 percent of lands with geothermal resources for sale on a basis other than cash bonus bidding, as opposed to 10 percent under S. 1388. Second, this provision would expire under the current bill on December 31, 1987. We believe that the percentage of lands offered for sale should be increased to 10 percent and that no "sunset" provision be included in S. 883.

Public bodies -- like small companies -- have difficulty in competing for leases in a cash bonus bidding system. Unlike large, private enterprises, public bodies do not have immediate funds, and this quite often requires voter approval. If cash bonus bidding is to be used almost exclusively, as provided in S. 883, then this valuable public resource may ultimately be tied up by the nation's largest energy companies. Congress has consistently opposed such monopoly control over public resources. Requiring alternatives to cash bonus bidding similar to those in S. 1388 as introduced or as amended by this Committee, together with providing a public body lease "set aside," would insure that not only the largest and richest companies can develop this valuable national resource.

I respectfully request that my letter be included as part of the record on this bill.

Thank you for your consideration of our views.

Sincerely,

Alan H. Richardson
Legislative Director and
Legislative Counsel

AHR/mb

cc: Subcommittee Members

MAY 0 9 1983

PACIFIC GAS AND ELECTRIC COMPANY

PG&E + WASHINGTON, D. C. OFFICE • 1050 17TH STREET, N.W. 20036-5574 • 202 466-7960

May 6, 1983

Official Committee File

SENATE COMMITTEE ON
ENERGY AND NATURAL RESOURCES
RECEIVED
MAY 9 1983
WASHINGTON, D.C. 20510

The Honorable John Warner
Chairman
Subcommittee on Energy and Mineral Resources
Committee on Energy and Natural Resources
United States Senate
Washington, D. C. 20510

Dear Mr. Chairman:

Re: Geothermal Leasing Act

In accordance with arrangements made with your Subcommittee staff, Pacific Gas and Electric Company herewith files its statement to be included in the May 2, 1983, hearing record for S. 883 and S. 558, Geothermal Leasing Act Amendments.

We are users of geothermal steam and not producers. As such, we defer to our colleagues in the drilling industry for comments on most of the acreage and land-use issues in the Bills. However, on behalf of our ratepayers, we do most vigorously oppose inclusion in any Bill which is sent forward to the Senate any provision for a preferential set-aside of any amount of acreage for exclusive leasing to municipal or publicly-owned electric utilities. S. 558, unfortunately, includes such a municipal preference. The citizens served by municipal power services should not, by statute, be put in a privileged or preferential status while all other citizens in the same state or area are placed in a lesser or inferior position. No such preference exists for oil, gas and mineral leases offered by the United States government. Such discrimination, if included in the 1983 Amendments to the Geothermal Leasing Act, would create enormous controversy and dissension, especially in California where the majority of geothermal development has taken place to date. Such development, incidentally, has included successful competitive bidding for leases by several public power entities. In so doing, municipalities have demonstrated that they do not need any statutory preference to insure their access to the resource.

(more)

GENERAL OFFICE • 77 BEALE STREET, SAN FRANCISCO, CALIFORNIA 94106 • 415 781-4211

Your personal interest is enlisted to eliminate from the Committee's final Bill any leasing or acreage preferences which favor one group of consumers/ratepayers over another.

Sincerely,

Ralph B. Dewey
Assistant to the
Chairman of the Board

Attachment - Statement of Pacific Gas and Electric Company before Senate Committee on Energy and Natural Resources, Subcommittee on Energy and Mineral Resources, 5/2/83

cc: Members, Senate Committee on Energy and Natural Resources:
The Honorable James A. McClure
The Honorable Mark. O. Hatfield
The Honorable Lowell P. Weicker, Jr.
The Honorable Pete V. Domenici
The Honorable Malcolm Wallop
The Honorable Frank H. Murkowski
The Honorable Don Nickles
The Honorable John Heinz
The Honorable Chic Hecht
The Honorable John Chafee
The Honorable J. Bennett Johnston
The Honorable Henry M. Jackson
The Honorable Dale Bumpers
The Honorable Wendell H. Ford
The Honorable Howard M. Metzenbaum
The Honorable Spark M. Matsunaga
The Honorable John Melcher
The Honorable Paul E. Tsongas
The Honorable Bill Bradley

Mr. Michael Harvey, Chief Counsel for Minority, Committee on Energy and Natural Resources

STATEMENT OF
PACIFIC GAS AND ELECTRIC COMPANY
BEFORE THE
SENATE COMMITTEE ON ENERGY AND NATURAL RESOURCES
SUBCOMMITTEE ON ENERGY AND MINERAL RESOURCES

MONDAY, MAY 2, 1983

Pacific Gas and Electric Company (PGandE) thanks the Chairman and the Committee for affording us the opportunity to participate in these hearings which will examine the nation's policy on geothermal development and changes in present law which are being proposed in S. 558 and S. 883.

Since 1958, PGandE and its steam suppliers have been developing the only commercial vapor-dominated "dry steam" geothermal project for the production of electric power in the continental United States. Located in the Geysers-Calistoga Known Geothermal Resource Area (KGRA) in northern California, the Geysers project has been the largest geothermal installation in the world since 1973. At present, PGandE has in service 17 generating units with a total net operating capacity of 1,137,000 kilowatts (kw) and plans to install an additional 715,000 kw of capacity by 1992. Three entities are also planning and/or building power plants at the Geysers. These are the California Department of Water Resources, Northern California Power Agency, and Sacramento Municipal Utilities District. Additionally, Occidental Geothermal, a commercial developer, is constructing a geothermal unit, the power from which will be sold to PGandE.

Geothermal resources play an important role in California's overall energy picture, both present and future. Geothermal currently comprises approximately 10 percent of PGandE's energy supply is one of the Company's more inexpensive forms of baseload electric generation. This lower cost is translated as lower rates to PGandE's customers. Realizing the value of geothermal energy as a resource, the California State Legislature and the California State Energy Resources Development Commission have undertaken efforts to encourage its development -- including providing an expedited one-year licensing process for geothermal power plants.

Because of PGandE's extensive efforts and the state's continued interest in geothermal development, the Company encourages legislation which would expedite exploration and development of new geothermal resources. Legislation, such as S. 883, would serve to clarify uncertainties and liberalize leasing procedures and terms under the Geothermal Steam Act of 1970 -- thereby supplementing the existing incentives provided by the contract price paid for steam, various tax credits, and state programs. The benefits of this bill will be realized largely by geothermal resource developers. PGandE traditionally has not sought to develop its own geothermal resources but has instead stood in the position of purchaser and end user of resources developed by others. However, PGandE's customers will also benefit from the legislation to the extent that additional geothermal exploration and development does occur thereby making more resources available for the energy market.

S. 558 would provide similar benefits as a result of the analogous provisions; however, as currently written, the bill would limit the extent to which the public as a whole could receive such benefits as a result of the inclusion of a provision, in Sec. 5 (a), which would require that up to 10 percent of the acreage leased in any year be set aside for public bodies.

PGandE vigorously opposes this provision because it is unnecessary, discriminatory, and in direct conflict with national policy. As referenced earlier, both PGandE and various public entities have been able to pursue development of geothermal resources in the Geysers area in a freely competitive market. There is no reason to believe that continued development by public entities requires legislative intervention such as that proposed in the bill.

Furthermore, this provision is clearly inconsistent with national objectives calling for the use of national resources to benefit the greatest public segment. In the West, where the nation's geothermal resources are concentrated, three-quarters of the residents are served by investor-owned utilities. Consequently, with enactment of such a provision, the vast majority of utility consumers could be deprived of access to the benefits of this preferred resource to the extent that lands are preferentially earmarked for the advantage of a few. Allowing such an automatic priority would not insure that these tracts were used to the maximum extent possible and to the maximum benefit of the public in general.

For these reasons, PGandE urges strongly that Section 5(a) be deleted.

This issue of unnecessary preferential treatment for public entities is raised to a lesser degree in Sec. 6 of both S. 558 and S. 883 which would allow deferral of royalty payments from public entities for nonelectric geothermal developments where legal limitations on front-end financing would prohibit or significantly deter development. As referenced earlier, public entities have, in fact, been able to develop geothermal resources at the Geysers under existing law. The proposed preferential treatment therefore, is not needed and would be a disservice to the public as a whole. For these reasons, PGandE urges that the royalty deferral provision of Section 6(a) be deleted.

With these changes, both S. 558 and S. 883 would make a positive contribution to the future development of the nation's geothermal resources for the benefit of the public. Such development -- if carefully undertaken with due protection of the environment, as both bills provide -- is in the best interest of all consumers and will help promote the continuing national goal of increased energy self-sufficiency.

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R. KEITH GUTHRIE
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RICHARD D. RATHVON
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SUSAN TOMASKY
DEBORAH M GOTTHEIL
DAVID H. DICKIESON
DAVID M. SCHLITZ

May 4, 1983

Mr. Roger Sindelar
Subcommittee on Energy
and Mineral Resources
Room SD-306
Washington, D.C. 20510

Dear Roger:

Please find attached a written statement which Republic Geothermal, Inc. would request be added to the hearing record on S. 883 and S. 558.

After having endorsed Senator McClure's legislation, the Republic testimony outlines two suggested amendments. Most important is an amendment suggesting a change to the language now found in section 7 of Senator McClure's bill dealing with those circumstances under which the primary lease term can be extended. On behalf of Republic, I would ask that you give this particular suggestion your every consideration as the Committee moves towards mark-up of this proposal.

Of course, I would be most happy to provide you with whatever additional details are necessary regarding the suggested changes made in Republic's testimony.

Sincerely,

Ben Yamagata

Attachments

Written Testimony Submitted
by
Republic Geothermal, Inc.
to the
Senate Energy and Natural Resources Committee
Subcommittee on Energy and Mineral Resources

May 2, 1983

Republic Geothermal, Inc. (RGI) is submitting this written statement in support of legislation (introduced by Senator McClure and others, S. 883) proposing to make certain changes to the Geothermal Steam Act of 1970 (the "Act"). RGI is a fully integrated geothermal resource development company engaged in land acquisition, exploration, drilling, steam and power production, and research activities.

In the past several years RGI has submitted written testimony and appeared before subcommittees of the Senate Energy and Natural Resources Committee and the House Committee on Interior and Insular Affairs in general support of legislative proposals designed to expedite the leasing of federal lands for geothermal energy development. The changes to the Geothermal Steam Act which have been proposed in S. 883 are vitally important to the geothermal industry. As the largest, independent geothermal company in this infant industry, Republic encourages enactment of S. 883 with minor modifications which are detailed in this statement.

Senator Jackson, an early friend and strong advocate and supporter of geothermal energy, has also introduced legislation (S. 558) similar to that introduced by Senator McClure. While RGI endorses several provisions of S. 558 which are similar to provisions found in S. 883, there are a few provisions in Senator Jackson's proposal which are troubling and which Republic cannot support. Therefore, for the sake of clarity, this statement is confined to that measure (S. 883) which Republic fully endorses subject to the modifications suggested below.

In our judgment, enactment of S. 883 as modified by the suggestions made in this statement, would greatly facilitate the leasing and development of geothermal prospects on federal lands while continuing to preserve the environmental integrity and proper husbanding of our public lands. To be more specific, we can more effectively tap and utilize our country's geothermal resources by significantly narrowing the definition of "known geothermal resource area" (KGRA), eliminating disincentives for non-competitive lease applicants to explore those lands under application, increasing the allowable acreage limitation per state, and extending the primary lease terms if demonstrable commitments have been made to develop the lease.

With respect to the provisions contained in S. 883, Republic would like to specifically comment upon the following sections:

1. Section 3 of S. 883, which redefines, in section 2(e) of the Geothermal Steam Act of 1970, "known geothermal resource area" (KGRA);

2. Section 5, which amends section 4 of the Act by giving non-competitive lease applicants priority in, or exemption from, the competitive bidding process if the lands under application are designated as a KGRA subsequent to the lease application being filed;

3. Section 7 of S. 883, which amends section 6 of the Act by providing greater flexibility in granting administrative extensions of primary lease terms when commitments to develop the lease have been made but prevailing economic conditions justify additional time; and

4. Section 8 of S. 883, which amends section 7 of the Act by increasing from 20,400 to 51,200 the acreage per state of federal lands available for geothermal leasing to any one entity and which also permits the Secretary of Interior, after 1990, to increase the available acreage per lessee to 115,200 acres per state.

DISCUSSION OF SPECIFIC SECTIONS OF S. 883

1. Definition of KGRA

Section 3 of S. 883 redefines "KGRA" so that designation of an area as a KGRA is based upon a finding that substantial physical evidence exists that there are geothermal resources in the area sufficient to engender a belief that the prospects for generating electricity in commercial quantities warrant substantial expenditures. This definition eliminates the "competitive interest" test which has resulted in the creation of many isolated KGRAs which, when offered for sale, have not generated any bids. Section 5 of S. 883 would also limit the number of leases offered by competitive bidding by automatically declassifying those KGRA lands receiving no bids. Although these two changes may decrease the number of competitive leases eventually issued, and thus result in a potential loss of revenue from bonus bids, the Treasury will be more than compensated by the timely accumulation of both rentals and royalties which will be derived from these non-competitive leases.

2. Protection for Non-Competitive Lease Applications

Present law includes the inequity of having a non-competitive lease application rejected on the basis of the lands being designated as a KGRA long after (in one recent case nearly seven years after) the filing of the application. Section 5 of S. 883 corrects this inequity by granting to the applicant the non-competitive lease if the lands are not designated as a KGRA within one year of the application being filed. Further, section 5 grants the applicant the right to match the highest competitive bid for the parcel (if the lands are designated a KGRA within one year of the application being filed) or the right to the non-competitive lease itself if the applicant was responsible for the exploration which resulted in the designation of the lands as a KGRA. The possibility of lands being designated a KGRA, thereby invalidating previously filed non-competitive lease applications, has been a major impediment to prudent operators undertaking exploration operations on or near lands upon which they have unprocessed lease applications.

3. Primary Term Extensions

Section 7 of S. 883 addresses and attempts to resolve the problems being encountered by geothermal developers with respect to the timely demonstration of economic utilization of a geothermal lease. However, section 7 properly limits the authority to grant limited extensions of primary terms to only those circumstances where administrative delays or marginal economics are associated with the construction of the facility which will use the geothermal energy to produce electricity. Republic endorses the concept of granting an extension of the primary term under these circumstances but would also respectfully note to the Committee that the consummation of bona fide contracts for delivery of geothermal resources, apparently remains a prerequisite for extensions under S. 883 as currently drafted. Such contracts are as dependent on economic justification and timely administrative action as is the actual construction of a facility which uses the geothermal feedstock. Therefore, Republic strongly recommends that the same criterion for construction of facilities be applied to consummation of bona fide contracts when related to primary term extensions. In order to facilitate this notion, we have taken the liberty of providing draft legislative language which the Committee may wish to consider. This draft language, which is appended to this statement, would, in our opinion, satisfy this concern about recognizing that bona fide contracts for delivery of geothermal resources are captive to the same delays occasioned by geothermal utilization facilities which are to be constructed.

4. Increased Acreage

While RGI supports and encourages affirmative Congressional action to increase the amount of acreage which can be held in each state by any one entity, we would urge the Committee's consideration of an acreage limit in excess of the 51,200 acres per state as now provided in section 8 of S. 883.

There appears to be no justification for settling upon the 51,200 acres. Indeed, this amount seems to have been chosen simply because legislation in the last Congress settled on that number. At a minimum, we would urge the Committee to carefully examine the rationale for the 51,200 acre per state limit. It should be emphasized that the economic success of small companies like Republic (that is, companies which are solely engaged in the exploration and development of geothermal energy and not involved in any other business), will be greatly influenced by a rational, well-grounded federal lands policy. We therefore believe that a federal lands policy should include a recognition of the business realities of geothermal development by small-scale geothermal companies.

RGI would recommend that the language of section 8 be amended so that, at a minimum, the Secretary of Interior has the immediate discretionary authority to raise the acreage limit in any one state to 115,200 and that, by 1985, the acreage limit per state be set at 115,200. This recommendation is made for the following reasons:

First, although the geothermal energy underlying as little as 1,000 acres of land may be technically sufficient to ensure that enough geothermal reserves are available to last the economic life of a commercial-sized geothermal power production facility, utilities considering a commitment to purchase geothermal resources can be expected to require the developer to control many times the geothermal reserves necessary for one power plant. Utilities make this requirement to ensure not only that the reservoir is capable of supplying energy to the power plant for its entire economic life, but also that the reservoir is large enough to make economic the construction of expensive new electric transmission lines into the area. Thus, a geothermal resource developer, in order to develop the resources in the most expeditious manner, needs to control a significantly large portion of the geothermal reserves in any one reservoir. Typically, this will mean controlling from 5,000 to 10,000 acres in any one prospect.

Second, the technology for discovering and quantifying geothermal resources has not been developed to nearly the degree of sophistication as now found in oil and gas exploration. Geophysical and geochemical techniques can only generally outline those areas which have a potential for geothermal resources and which should, therefore, be leased. These areas, typically ranging from 20,000 to 30,000 acres in size, must be controlled by the geothermal resource developer in order to ensure that the core of the geothermal reserves is eventually found to lie within the area. Subsequent to leasing, the drilling of temperature gradient holes and deep resource wells will eventually narrow down the geothermal prospect from 30,000 acres of potential geothermal resources to 5,000 to 10,000 acres of actual geothermal reservoir and geothermal reserves. However, the drilling of temperature gradient holes and deep resource wells may take from two to five years to complete subsequent to leasing, and for each geothermal prospect on which a well capable of commercial production is drilled, probably five prospects will have been drilled which did not produce geothermal resources in commercial quantities.

This means that typically a geothermal developer may have to identify and lease six new prospects of approximately 25,000 acres per year, and hold on to these prospects for approximately five years while conducting exploration operations, in order to find one prospect of about 5,000 to 10,000 acres which is capable of commercial production. Even an acreage limitation of 51,200 acres will allow a geothermal developer only two prospects per state. Once these two prospects are identified and leased a geothermal developer cannot conduct additional initial exploration or leasing activities in that state until the orderly process of detailed resource exploration identifies the true extent of the geothermal resource and allows the geothermal developer to decrease the amount of acreage necessary in that particular prospect. The acreage limitation needs to be significantly increased above the 51,200 acre level so that the limited number of companies that are technically and financially able to explore and develop geothermal resources can do so in an orderly and continuous fashion.

In addition, we would note that:

1) Increasing the size of the acreage limitation will also likely increase the size and rate of revenue intake for the federal government through the collection of rentals and royalties. It will certainly increase revenues for local governments since once a lease is issued that property is subject to local taxes.

2) Increasing the geothermal lease acreage limit will stimulate geothermal exploration and help identify those areas where geothermal resources, although not suitable for the production of electrical energy, may be applicable for direct heat applications such as space heating and food or industrial processing.

3) The Geothermal Steam Act of 1970 contains certain due diligence requirements which over the life of a lease adequately control speculation and insure that leased lands are explored and developed and not simply held for speculation. Thus, increasing the acreage limitation will not lead to speculation in geothermal leases. It should also be noted that, contrary to the concerns expressed by some, increasing the acreage limitations will not alter the ability of certain groups to engage in speculation by controlling large numbers of geothermal leases. This type of speculation is possible for a limited period no matter what the size of the acreage limitation.

Conclusion

S. 883, with the suggested modifications to (1) the availability of the authority to grant extensions to the primary lease term and (2) the increased acreage limitation, is a welcome and needed set of amendments to the Geothermal Steam Act of 1970. Although enacted some twelve years ago, the success of the 1970 Act has still to be evidenced; except for the Geysers resource in California, there is still no widespread use of our vast, domestic geothermal resource base. In fact, no federal lease is today providing the resource for commercial electrical power production. Republic Geothermal believes that the changes called for by S. 883, as further modified herein, can assist our infant industry in more rapidly developing this indigenous energy resource.

Sec. 7(a) Section 6(a) of such Act (relating to lease terms) is amended to read as follows:

"Sec. 6(a) Geothermal leases shall be for a primary term of ten years. If geothermal resources are produced or utilized in commercial quantities within this term, or any administrative extension thereof as provided in subsections (b) or (c), such lease shall continue for so long thereafter as geothermal resources are produced or utilized in commercial quantities. For the purpose of this subsection, the term "produced or utilized in commercial quantities" includes the completion of one or more producing or producible wells and either (i) a bona fide sale for delivery of geothermal resources to a facility or facilities installed or to be installed not later than five years after the expiration date of the primary term or any administrative extension of such term or (ii) in the case of utilization by the lessee, proof of commitment to construct such facility or facilities at the expiration date of the primary term or any administrative extension of such term and construction of such facility or facilities not later than five years thereafter."

(b) Section 6(b) of such Act (relating to extension of lease term) is amended to read as follows:

"(b) In the event (1) a bona fide sale for delivery of geothermal resources to a facility or facilities installed or to be installed or construction of a facility or facilities by the lessee has not been possible prior to the expiration of the primary term of the lease or any administrative extension thereof as provided in subsection (c) due to administrative delays beyond the control of the lessee or due to demonstrated marginal economics of such a facility or facilities and (2) substantial investment in development of the lease has been made, the Secretary shall, upon petition by the lessee, grant extensions totalling not more than 15 years beyond the expiration date of the primary term of the lease. If such extension is granted the lessee shall submit annual reports detailing bona fide efforts (i) to resolve the administrative delays, (ii) to consummate such bona fide sale, or (iii) to bring the facility or facilities into economic production."

(c) Section 6(c) of such Act (relating to the extension of lease term) is amended to read as follows:

"(c) Any lease for land on which, or for which under an approved cooperative or unit plan of development or operation, actual drilling operations are commenced prior to the end of its primary term and are being diligently prosecuted at the time shall be extended for five years and so long thereafter as geothermal resources are produced or utilized in commercial quantities."

(d) Section 6(d) of such Act (relating to definition of "production or utilization") is deleted and sections 6(e) and 6(f) are redesignated as section 6(d) and 6(e), respectively.

Statement of Kenneth R. Kupchak
Member of Volcano Community Association
before the

Subcommittee on Energy and Mineral Resources
United States Senate

on
S. 558 and S. 883
May 2, 1983

Mr. Chairman and Members of the Subcommittee, my name is Kenneth R. Kupchak, Esq., and my backdoor neighbor is Hawaii Volcanoes National Park in Hawaii. Your Subcommitee's consideration of amendments to the Geothermal Steam Act of 1970 is very timely. I, along with the Volcano Community Association which joins herein, and the two other Volcano community associations, the Hawaii Audubon Society, the Hawaii Chapter of the Sierra Club, and 24 individuals, have been actively involved in protecting the Hawaii Volcanoes National Park from the harmful effects of an application to develop a 250 megawatt geothermal power complex sprawling approximately ten miles along the northeast border of the park. It is, however, extremely unfortunate that both S. 558 and S. 883 offer little, if any, protection for Hawaii Volcanoes National Park against the damage it will undoubtably suffer if the development commences as planned. Quite unlike Yellowstone and other park system units with geothermal features, the threat here is not as great to the geothermal resource as the danger is to the other resources for which the park is also famed: its unique flora and fauna, habitats for endangered animal and plant species, clean air, and relatively pristine areas.

The requested development calls initially for drilling pads sufficient to accomodate wells, of which conceivably 50% might be located within 1,000 feet upwind of the park boundary. The unmistakable sights, sounds, and odors of geothermal development on the threshold of our national park will be impossible to ignore, and could drive away park visitors, disturb the delicate ecosystem, and pollute the air and the area's catchment water systems. The venting of the wells will produce noise levels associated with the sounds of jet engines at take-off. Drilling and production will continue twenty-four hours per day, seven days per week over a period of years. When the wells must be taken out of production, as in the case of the threat of a volcanic eruption (such as the one that has been occurring in the middle of the proposed well grid since January 3, 1983), the wells will vent toxic substances such as hydrogen sulfide, mercury, arsenic, radon and boron freely into the atmosphere.

Although the land where production would occur is part of a private estate, it has been designated by the State of Hawaii as a Conservation District. This Congress has even passed a bill which qualifies a majority of this property for a wilderness acquisition by the Hawaii Volcanoes National Park. The Kahauale'a, as this parcel is known, is an extraordinary Hawaiian rain forest ecosystem acclaimed by evolutionary botanists worldwide. This area contains the largest remaining tracts of natural rift zone forest in Hawaii and deserves consideration for inclusion in the park. Extensive geothermal development activity would have severe, unmitigable impacts here as well as inside the park boundaries.

The Volcano community does not oppose geothermal development. In fact, it actively encouraged consideration of a proposal to shift the development to a tract of land further downrift from the park than the parcel now slated for development. The Volcano Community Association believes that this area has a higher potential for geothermal energy extraction and is located in a less hazardous portion of the rift. It is worth noting that the above mentioned present eruption obliterated ten of the drill sites now proposed for up to sixty geothermal wells.

The Volcano community supports the proposed modifications and amendments offered by the National Parks & Conservation Association, including: stringent monitoring criteria to protect not only the thermal features of National Park System units but other vital resources of the parks, protective language for all of the twenty-one park units where significant thermal features exist including Hawaii Volcanoes National Park, and the requirement for the Secretary of the Interior to receive public comment on all areas subject to leasing prior to the decision to grant a lease.

Thank you for the opportunity to testify today before the Subcommittee and I would be glad to respond to any inquiries.